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State of California
THE RESOURCES AGENCY
Department of Fish and Game

SAN DIEGO VERNAL POOL STUDY, 1978[1/]

by

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ABSTRACT

Populations of 9 threatened vernal pool plant species were surveyed and inventoried within 2,117 pools in the coastal San Diego region of California. The regional vernal pool habitat has decreased from about 28,595 acres prior to 1850 to 2,692 acres as of July 1, 1978; a 90% loss. During the study an additional 198 acres was destroyed; a 7% loss in a 9 month period. To provide a basis for possible land preservation, pool complexes are ranked within various categories with respect to feasibility and suitability of acquisition.

1/ Supported by Endangered Plant Program, 145, Nongame Wildlife Investigations, California Department of Fish and Game, Job I-1.0, Job Final Report (August 1979).

CONTENTS

Figures

Tables

INTRODUCTION

The proposal to prepare an inventory of the remaining vernal pools of San Diego County was initially made to the Department in 1977 when California Native Plant Protection Act legislation was pending. The high densities of endemic and rare plant taxa, the extreme decimation, and unexplained reason of formation of the vernal pools seemed justification for a quantitative assessment of the remaining pools of San Diego County. Also the involvement of many development projects in the destruction of vernal pool habitat often required better knowledge of the exact location, relative biological condition and remaining acreage of vernal pools in San Diego County than was then available.

For the purposes of this survey, the vernal pool habitat was defined as coastal areas of level topography containing natural depressions which would fill with water from winter rains and develop a flora during dessication consisting of certain associated diagnostic plant taxa such as Psilocarphus, Broadiaea, Pogogyne, Callitriche, Elatine, Ophioglossum, Myosurus, Eryngium, Downingia, Navarretia, Isoetes and Pilularia. Often the habitat was correlated with particular soil types, usually having a water-impervious duripan a few inches under the soil surface. Only in the instance of a few of the Otay Mesa pools (Area J) were pools identified which did not conform to this definition. This exception was allowed due to the presence of the very rare grass, Orcuttia, which seems to warrant special consideration based on its occurrence elsewhere in vernal pools.

PURPOSE

Although many questions could be asked of a survey of vernal pools, the purpose of this survey was to answer (1) which of the rare, endangered, or otherwise sensitive plants occur in the vernal pools, (2) what is the extent of range of these sensitive plants in San Diego, (3) how many pools or acres of pool watershed remain in San Diego County, and (4) where are the best pools to be found for preservation. No quantification of plant distributions within pools or between pools was intended in the survey nor was any autecological work on the biology of the various plants intended. Such more detailed surveys are now underway, using distributional data already obtained in this survey.

METHODS

The survey of San Diego County for remaining vernal pool habitat involved (1) on-ground observation of all pool areas except those adjacent to the Miramar Naval Air Station runways, (2) use of aerial photography held by the County of San Diego and California Department of Transportation, and (3) two plane flights over the western portion of San Diego to observe and photograph suspected vernal pool areas. Preliminary mapping of regions of known or suspected vernal pool areas was prepared by Mr. Thomas A. Oberbauer (1976) of the Integrated Planning Office, County of San Diego in conjunction with land use planning for Otay Mesa. Also, known herbarium collection locations of vernal pool plant taxa such as Downingia, Eryngium, Pogogyne, Myosurus and Isoetes were examined. Often, however, these locations were extremely vague; i.e., Kearny Mesa, mesas east of San Diego, or mesa north of San Diego. Discussions with senior biologists in San Diego also gave clues about vernal pool locations, particularly historic sites, now destroyed

by development. Use of the current soil survey (U. S. Department of Agriculture 1973) as well as previous, less detailed soil surveys, served as a predictive model in searching for vernal pool habitat on Redding series soils. Other soil series had such a low overall correlation that it was found they were not useful in predicting locations.

The plane flights over suspected vernal pool areas of San Diego County were made by a chartered single-engine aircraft from Mustang Aviation out of Brown Field on Otay Mesa. Observers on the various flights were Thomas A. Oberbauer, Timothy L. Cass, Stephen J. Montgomery and R. Mitchel Beauchamp. Oblique photographs were taken, using Ektachrome and Kodachrome slide film. Most useful results were obtained when photographing pools having Downingia in a full flower condition; thus imparting to the area a light blue cast which showed up well in the photographs. Because of the overflights in the vicinity of airports; i.e., Brown Field, Ramona Airport, Montgomery Field, Miramar Naval Air Station, and Palomar Airport, the use of a well-qualified pilot with knowledge of radio frequencies for the areas was necessary. Permission to fly over Miramar Naval Air Station runway was obtained several days before the flight. The proposed flight over the Pendleton pool area was not permitted.

In order to determine the original historic range of vernal pool habitat in San Diego County, several senior biologists were contacted regarding their experience with this unique ecosystem in the area. Those persons contacted were Dorothy Harvey, Dr. Andrew C. Olson, Charles F. Harbison, Dr. Edith Purer, Helen V. Chamlee and Darley F. Howe. Prior conversations with Mrs. Ethel Bailey Higgins in 1963 concerning vernal pools were also very useful.

The on-ground portion of the survey was performed by Mr. Timothy L. Cass, a biologist with experience in quantative data collection and assessment of biological resources. Additional on-ground survey was performed by R. Mitchel Beauchamp, either alone or in company with Mr. Cass. The survey was performed from 7 June 1978 to 9 February 1979. The prime period for flowering in vernal pools is March to May. However, this late season survey allowed examination of the pools in a dry, less biologically vulnerable condition. Some of the plants with more ephemeral parts were not evident during this dormant season, such as Ophioglossum and Pilularia and could not be detected. Also the identity of plants with persistent parts of low diagnostic value, such as Muilla and Isoetes was tentative. Because of the extended nature of the survey into the winter rainy season, as well as data taken from pools in previous wet seasons, some of the identifications of sensitive taxa in some sectors are based upon flowering material rather than mostly from dried remains.

During the on-ground survey an effort was made to determine the number of pools in watershed units; i.e., sectors, and to determine the size of the pools in each sector. Initially the sectors were defined as rather small units, but as experience and efficiency improved, the sectors were defined more broadly. Also during the on-ground survey an estimate was made of the level of disturbance to the pools on a scale of 0 (no disturbance) to 3 (major biological disruption with long-lasting effect). The presence or absence of selected sensitive plant taxa in each sector was monitored. No quantative data were obtained in this manner, only whether the organism was present or not in any pool of a given sector.

Mapping of the pool was done in the field using the 1" = 800' maps available from the City of San Diego Engineering Department. Some 1" = 200' scale County of San Diego maps were used where the smaller scale maps were not available. Also 7½' U. S. Geological Survey quadrangles were used where detailed mapping was not particularly crucial. A field notebook was maintained during the on-ground survey, with all observations recorded as each sector was

covered. Data from the field maps were transferred onto duplicate sets (Figure 3) with Mr. Cass double-checking the accuracy of the data transfer. Also a matrix of the data from the observations was prepared (Table 1). Color slide photographs of most sectors were made as confirmation of the presence of a sensitive plant species, usually with diagnostic skylines in the background of the photo for reference purposes. No voucher specimens were taken due to both the threatened nature of the plants involved and also due to the limited applicability of herbarium specimens to the study. Permission to survey portions of Miramar Naval Air Station was obtained by California Department of Transportation but only in a few areas of the Station were significant areas actually surveyed on the ground. Permission to survey at Montgomery Field was obtained on the day of the survey from the administration headquarters. The survey on Camp Pendleton was coordinated through the Natural Resources Offices of the Base.

Also included in the data of this report is information obtained from two private consulting firms, Westec Services, Inc. and Regional Evnironmental Consultants, Inc., who were involved in more limited vernal pool surveys of the Mira Mesa and Kearny Mesa areas.

RESULTS

The quantitative data obtained from the field surveys are organized into tables and maps which are summarized in this section for pool complex comparisons. For each pool complex the narrative is supported by entries in tables which indicate floristics and sizes of individual pools within each complex (Table 1), regional pool sizes and associated features (Table 2), pool size reductions during the previous 129 years (Table 3), remaining vernal pool habitat within each soil type (Table 4), remaining pool habitat within public agency jurisdiction (Table 5), and criteria for disturbance rating for pool sector analysis (Table 6). The general location of vernal pools in San Diego County is presented within Figure 1, vernal pool areas within northern San Diego mesas within Figure 2, and areas for which detailed (1" = 800') distribution maps are available within Figure 3[1/].

Of the original estimated 1850 acreage of 28,595 acres, only 2,692 acres remained at the start of the study. During the study an additional 198 acres were lost. As of 15 March 1979, 2,494 acres of vernal pool remained, 8.7% of the 1850 distribution. The annual rate of habitat loss is currently 9%.

A - Tierrasanta East Vernal Pools

Because of the natural dissection of the mesa in this region, only two pool areas appear to remain which support pool formation. The A-3 pools occur in an area covered by the Tierrasanta Norte Master Development Plan. The A-4 pools are greater in number and floristically more diverse than those of A-3.

B - Mira Mesa North

This pool sector is located on the southwest-tending ridge between Penasquitos and Lopez Canyons. This ridge is often referred to as Lopez Ridge. Chamise Chaparral surrounds many of the pool areas. This area has been heavily investigated not only during this survey, but by two other surveys financed by private

1/ The detailed maps are not a part of this report but may be requested from the Department.

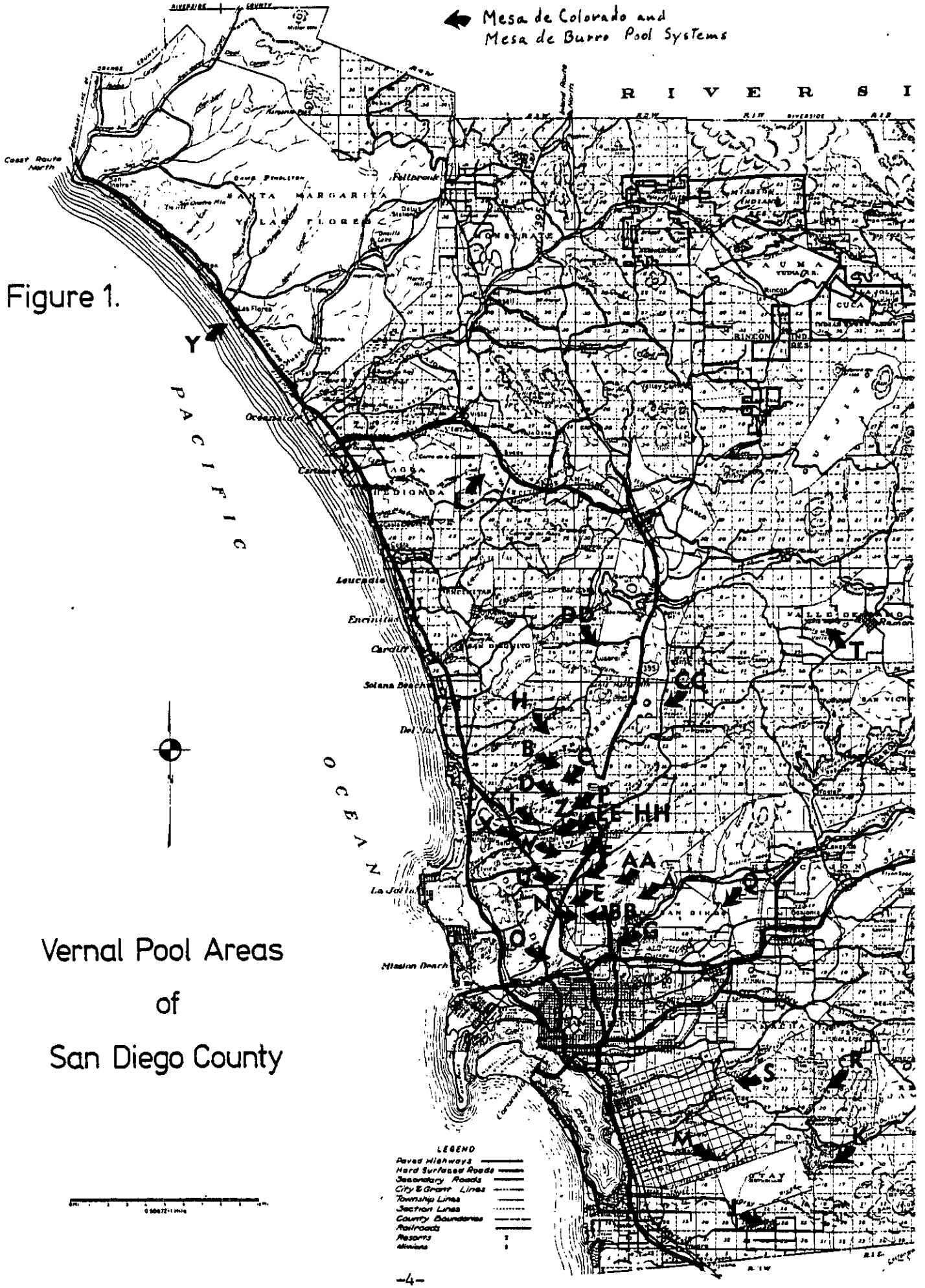
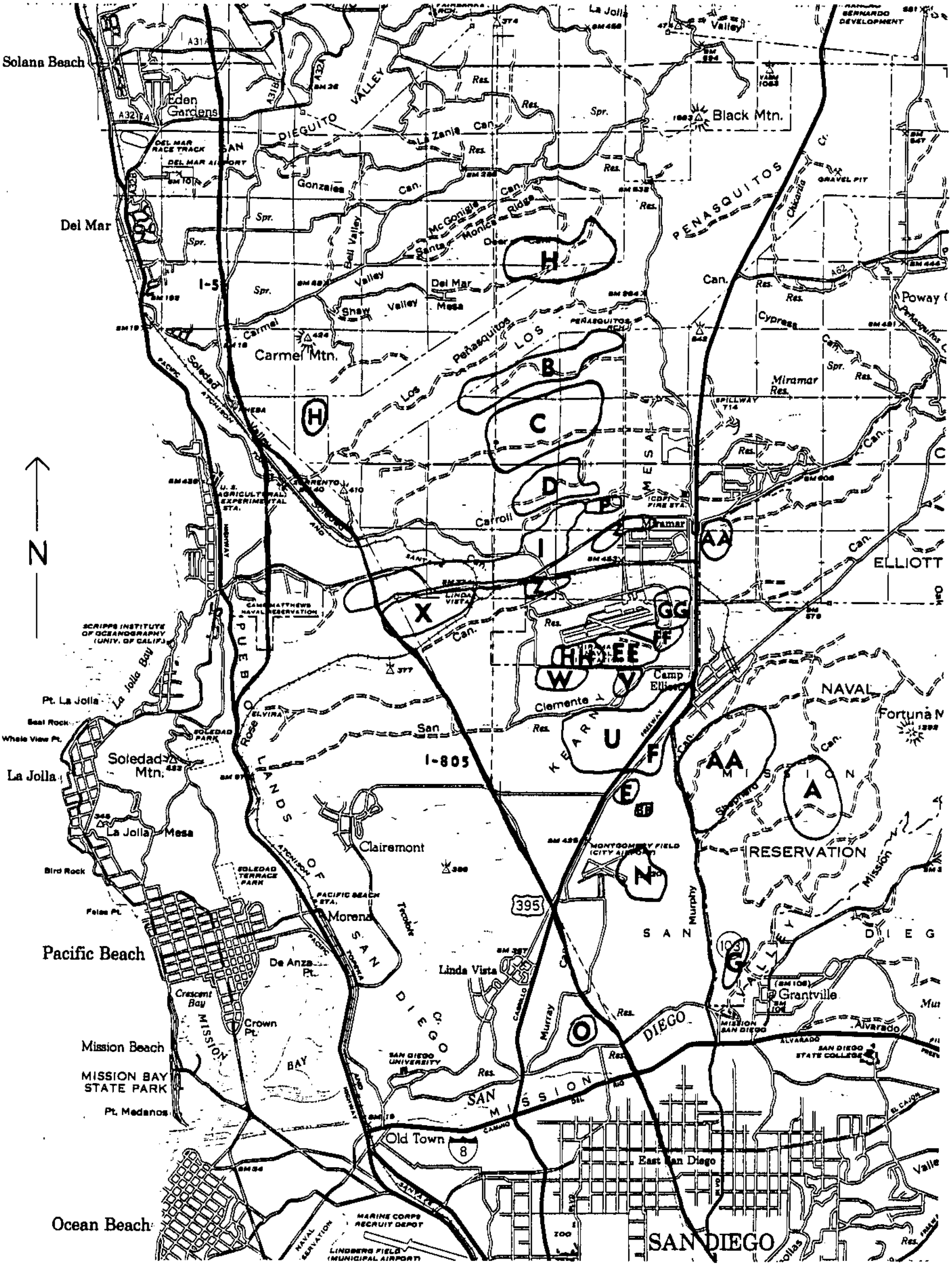


Figure 1.

Vernal Pool Areas of San Diego County

Figure 2. Vernal Pool Areas of Northern San Diego Mesas



1″ = 2 miles

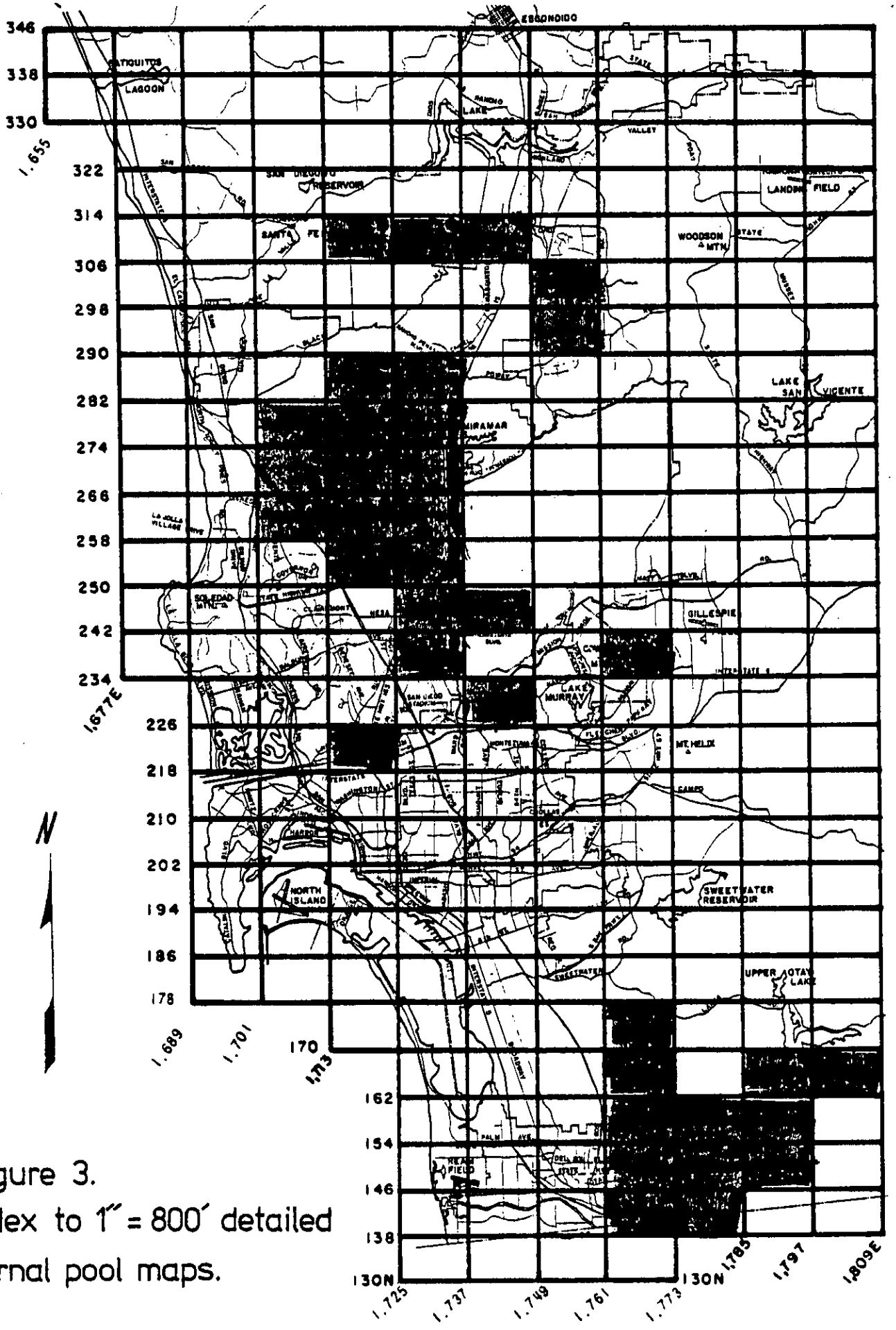


Figure 3.
Index to 1" = 800' detailed vernal pool maps.

developers. Generally, the disturbance of the pools in this sector is low, but present, due to the proximity of residences and a dirt access road into the area. Those pools traversed by the road, of course, have the greatest disturbance. Development of this sector is soon anticipated by the William Lyons Property Company and Penasquitos, Inc.

C - Mira Mesa Central

Because of the rather easy access to this pool sector from the unbarricaded west end of Mira Mesa Boulevard, as well as clearing of some brush, many of the eastern pools are disturbed. Trash dumping has occurred along access roads and the southeastern portion of the pools was destroyed during the survey by the Pardee Mira Mesa development. The western pool area is very interesting due to its pool density, extent of one large pool (C-1), and the association with grassy habitat rather than just Chamise Chaparral. Disturbance of the western extension of Mira Mesa Boulevard will mean the total loss of these pools through the inducement of growth on the mesa.

D - Mira Mesa South

This pool sector was reduced by 70% of its extent on 26 October 1978 through bulldozing by the Pardee developers. Portions of the sector still have pools on land owned by rock and gravel companies. One company has indicated willingness to place most of its pools into a preservation status. The other company has discussed the matter but has indicated that destruction of their pools is only a matter of time. The remaining pools of this sector are impacted by trash dumping and off-highway vehicle activity. Also the location of a major sewer line is responsible for disturbance of these pools due to the easy access it now affords to the area.

E - Kearny Villa South

About 70% of the pools in this sector were destroyed during the study period. The remaining pools occur in an old drive-in theater and are planned to be eliminated.

F - Kearny Villa North

These pools occur in native Stipa grassland and Chamise Chaparral on Navy land. The land is posted with signs but off-highway vehicle activity is the usual situation. The site, particularly the southern pools, is used for biological field trip purposes. The southern portion of this sector is scheduled for destruction by the eastern continuation of Highway 163 and Interstate Highway 15.

G - Tierrasanta South

This single area of pools is heavily disrupted by motorcycle and bicycle activity and some trash dumping. Apparently the land is the southern portion of the Navy's Murphy Ridge housing project.

H - Penasquitos North

This sector is the northern-most location known for Pogogyne abramsii. The area is also very diverse in pool sizes and has a large number of pools. Disturbance of the area is relatively low, with the eastern protion being more disturbed due to the proximity of the encroaching housing tracts. Several very large pools occur in this sector, occupying several thousand square meters. These large pools are even shown on the 7½' U. S. Geological Survey topographic

quadrangle for the area. The presence of brush piles in these pools indicates that they have been manipulated in the past, perhaps for the watering of cattle. Several pools in this sector were destroyed by the Penasquitos developers in October 1978 subsequently as other pool areas were identified by consultants. During March 1979 pool areas H 24-26 were destroyed by clearing for tomato fields. Because of the relatively undisturbed nature of the vegetation, the extreme northern location of the pools, their size diversity and high numbers, the H sector appears to be the best private sector for preservation. The present isolated nature of much of the sector lends itself well to preservation.

I - Miramar Industrial

The pools of the eastern portion of this sector are scattered among the various commercial warehouses and stores along Miramar Road. The western pools are still in undeveloped areas but impacted by off-highway vehicle use. A project is currently under environmental review which will eliminate a significant portion of these western pools. The associated vegetation is mostly Chamise Chaparral, but some grassland areas occur along Miramar Road at Carroll Canyon. During the survey the destruction of the Kendall pools (I-8) occurred without any mitigation although the significance of the pools and included endemic species was clearly noted in environmental documents on the project. None of the pools in the eastern portion of the sector appear suitable for preservation due to the high cost of the land. Some of the western pools have a Navy easement which involves a federal presence on otherwise private projects.

J - Otay Mesa

The pools of this sector occur on a substrate entirely different from those elsewhere in California. Also Pogogyne nudiuscula occurs in the pools, rather than P. abramsii. Agricultural use of the area has eliminated the pools down to a present remnant situation. Grazing in existing pool areas is further degrading their quality. The natural physiographic extension of these pools into Baja California Norte will certainly be completely eliminated due to commercial development on that side of the international boundary. The location of a second border crossing on the mesa will directly destroy several pools and indirectly stimulate the more rapid destruction of the Mexican pools by increased commercialization. The presence of the old Brown Field Bombing Range in a natural pool area is an interesting situation. Although most of the pools are natural, what appear to be bomb craters also now serve as the depressions for the endemic plants. The situation on the northern rim of Otay Mesa is also anomalous in that many of the Pogogyne plants grow out in moist open areas, rather than in depressions. Also the plants grow in association with Ferocactus viridescens. Because of the unique situations on Otay Mesa, the remaining vernal pools should all be retained. The destruction of these pools will mean the extirpation of Pogogyne nudiuscula in the United States and probably its complete extinction.

K - Otay River

The discovery of these pools was not anticipated and their discovery indicated a more extensive development of pools than originally occurred in the coastal plain of the region. Most of the pools occur south of Lower Otay Reservoir. These pools are in very good condition and in a very isolated situation. Although they occur near the Otay Mesa pools, no Pogogyne occurs in them.

L - San Marcos

These pools were relocated by Wayne Armstrong, Palomar College. They are an important pool sector since they are the only pools in the central coastal

region. Also they occur in a native Stipa grassland. A very unique association of Brodiaeas occurs in the sector, having Brodiaea orcuttii, B. filifolia and B. jolonensis growing sympatrically. This is the only known natural location for B. filifolia in San Diego County. These pools are soon to be destroyed by industrial development. No concern for preservation of this unique area has been indicated by the City of San Marcos.

M - Chula Vista

The few pools remaining in the Rancho del Rey and Otay Ranch areas are significant in that they indicate the former existence of pools in this area. No sensitive taxa were observed and disturbance is moderate. Development will shortly consume these pools. Expansion of the Otay Dump will also involve the southern-most pool area.

N - Montgomery Field

Location of these pools within the perimeter fence of this city airport has resulted in their de facto preservation. A few pools still occur outside the pools on private land but will be taken soon. Adjacent development, particularly along Ponderosa Road is already causing the silting of pools with the airport property. The pools have been disturbed on the periphery of the property because of discing for fire abatement. However, the Pogogyne abramsii appears to grow well in such conditions. The associated vegetation of these pools at the eastern portion of the runways is both grassland and Chamise Chaparral. Many of the pools occur along the small drainage through the area. Threats to these pools are relatively low, although several pools were destroyed by the placement of a sewer line during the survey. Discing, although not entirely destructive, does not appear to be a wise management tool for the pools. The fire threat in this area is very low due to the lack of structures. The Federal Aviation Administration is planning the construction of glide angle approach structures which may involve disruption of vernal pool habitat particularly by construction vehicles or waste concrete discharge. Preservation of these pools appears to be very compatible with airport operation. The proposed extension of the runway also appears to have no direct impacts on the populations of rare plants in the vernal pools there.

O - Mission Village

This remnant pool area occurs on land owned by a rock and gravel company. Proximity of the pools to the far edge of the property may save them. The area is fenced but children have cut the fence and use the site for play. This pool area is significant in that it is the southern-most of the Kearny Mesa system.

P - Camino Ruiz

These pools occur along Camino Ruiz and Arjons Drive. Industrial development occurs to the south and the area is currently under environmental review for development. The pools that occur to the adjacent west (Sector I) may be preserved by the rock and gravel company which currently owns that land. No preservation has been proposed for any of the P sector pools. Chamise Chaparral is the associated vegetation.

Q - Grossmont College

This pool system appears to be all that remains of the Fletcher Hills system which had several other endemic plants reported. Only Ophioglossum californicum was seen in the Grossmont College pools. The pool system is isolated but may

be destroyed for parking lots or athletic field uses by the college. It is apparently in county jurisdiction.

R - Proctor Valley

A single pool system along the west side of Proctor Valley Road was noted with Myosurus minimus apus. This situation is probably not a true vernal pool situation; i.e., having an underlying duripan, but is noted here only as a point of information.

S - Sweetwater Lake

This pool sector occurs on the southwestern side of Sweetwater Reservoir in a natural grassland. Preservation of the reservoir shoreline by the previous private owner has allowed de facto preservation of these pool and mound areas. However, pressure is now being placed to have the lake opened to recreation, thus jeopardizing not only the vernal pools but the rich waterfowl population of the lake.

T - Ramona

The large open grassland south of Ramona Airport has a few vernal pools. A-parently the system was much more widespread since depressions with Downingia occur in plowed fields on the southeastern portion of Ramona. The Ramona pool system is the eastern-most and highest elevation system in San Diego County.

U - Miramar Mounds Natural National Landmark

This portion of Miramar Naval Air Station lies south of San Clemente Canyon, between Highway 163 and Mercury Avenue extension to the Miramar dump. The sector has a large number of pools. Mapping of the area was difficult due to the lack of triangulation reference points within the sector. Widening of Highway 163 caused the disruption of drainage on the eastern portion of the sector and two large ponds now occur with significant rainfall. The southern-most pond has caused the suffocation of several vernal pools which it usually overtops. The extended duration of water in this deep pool appears to be creating proper habitat for Typha growth. The formation of the northern pool appears to be a stroke of luck in that the very rare grass, Orcuttia californica now grows on the north shore of the pond. Also the pond has a rich growth of Eryngium aristulatum var. parishii. Although the sector is considered as a "reserve" due to its designation as a national natural landmark, the sector has undergone and is still experiencing degradation. A discussion with the owner of the southern half of Miramar Naval Air Station from about 1946 to 1955, Mr. Wilbur Myers, revealed that the major portion of the U sector was cleared of Chamise Chaparral for cattle grazing in about 1946. A view of an aerial photo of the U sector clearly shows the various levels of disturbance. Only the northern fringe of the sector is natural. Currently the area is being impacted by several factors. Trash dumping along a former access road has now stopped for the most part and much of the trash has been removed by the local California Native Plant Society chapter. Several of the pool areas in this and other sectors have been ditched or channelized to drain them. This action was done by the County of San Diego's Mosquito Abatement staff. Conversation with the staff, particularly Mr. M. M. Mizrahi, indicated complete unawareness of the significance of the U sector as an intended preserve. A sewer easement crosses the sector and dirt roads there appear to still have occasional use.

The biggest threat to the U sector pools is the constuction of State Highway 52 which will consume about 25% of the sector. The legal definition of the

landmark was worded in such a manner that the highway would not involve the landmark; i.e., the southern boundary of the landmark being the northern limit of the freeway right-of-way. Vernal pool habitat would nonetheless be destroyed. The western portion of the landmark has been scraped in conjunction with the Miramir dump, located to the north of the landmark. Despite its past and present abuses, the U sector does contain a significant portion of the remaining vernal pool habitat in San Diego County.

V - Sim J. Harris

This small pool sector occurs west of the rock and gravel extraction lease in San Clemente Canyon. The pools have been disturbed variously, one serving as a storage yard for heavy timbers. The pools are few in number and scattered.

W - South Miramar Naval Air Station

These pools occur south of the Miramar NAS perimeter fence on the edge of the mesa. This sector was a portion of the Myers ownership from 1946 to 1955. The past use of the W sector is of great interest. The several pools now occurring there have a good selection of vernal pool-associated plants but no remains of Eryngium or Pogogyne were located during the dry season survey. The interest in these pools lies in the fact that they were completely plowed and the area cultivated in grain for several years. Mr. Myers stated that there was no pooling after the initial plowing but that the "pools came back after a couple of years." He attributes the reformation of the depressions to the deep seated edaphic variation in duripan heights and the expansion and contraction of the clay soil. Because of the current presence of the pools and the known past use of the sector, this sector is of particular interest regarding the study of pool formation and restoration. Currently the W sector is planned for use as a dump.

X - West Miramar Naval Air Station

This sector lies to the south and southwest of Miramar Road and the intersection with Eastgate Mall. Unauthorized use of the area by off-highway vehicles has seriously degraded several pools in the sector. The eastern portion, however, has several areas of intact pools. The vegetation is mostly grassland with some open areas of Chamise Chaparral. Fencing of this area is all that would be necessary to preserve the site.

Y - Pendleton

These few remaining pools are all that vouch for the former existence of vernal pools in the Las Flores-Oceanside area. The area was suggested as a possible pool area by Thomas A. Oberbauer as part of his assessment of San Diego County's remaining vernal pools, a project with the County Integrated Planning Office. It was earlier believed that pools did historically occur in the area, particularly Oceanside, since the type locality of Eryngium aristulatum var. parishii is Oceanside. The associated soil is apparently Huerhuero and Diablo clay according to the current soil survey.

Z - West Gate Miramar Naval Air Station

This sector occurs within the fenced and patrolled portion of Miramar NAS. It was the only sector for which permission was granted to survey. The pools occur in grassland and Chamise Chaparral. Pools in the eastern portion of the sector occur in disturbed areas. The western pool area is disturbed only by a single dirt road and the railway onto the base.

AA - East Miramar Naval Air Station

This is a large sector lying east of Highway 163, north of Clairemont Mesa Boulevard. This sector was heavily surveyed in conjunction with the easterly realignment of Interstate Highway 15. A wet season survey of this sector allowed a very accurate identification of sensitive organisms. Pools in the southern portion appear to have an unusual layer of large cobbles on their beds. The major portion of the pools in this sector is threatened by Interstate 15.

BB - Missile Road

This very small sector was, for many years, the main vernal pool field trip location. Just after the survey was begun these pools were filled in with truck loads of top soil. No other grading was done on the property. Destruction of this area is now complete.

CC - Pomerado Road

This sector occurs on the mesas east and west of Pomerado Road, north of Poway. No sensitive plant taxa were identified, however, the pool formation appears to be quite good after recent rains. Development of residential housing is expected to eliminate these pools. Jurisdiction involved with this sector is by both City and County of San Diego.

DD - Rancho Bernardo

The pools of this sector occur west of the Rancho Bernardo Industrial area and south of Artesian Road, within the City of San Diego's gerrymander into central San Diego County. Aside from Navarretia fossalis, no other sensitive plants were observed in these pools.

Unmapped Sectors EE, FF, GG, & HH - Miramar Naval Air Station Runway

The existence of vernal pools and very probably sensitive plant taxa, in these areas was determined by an overflight of the runway and photography of the suspected area. On-ground access to these areas was prohibited.

DISCUSSION

With the continued and sustained destruction of vernal pool habitat on the mesa lands of San Diego, the present remnant, estimated at 8.8% (Table 3), represents the last opportunity for maintenance of this habitat in a viable condition. Although protection is inferred for the 203 acres of vernal pool watershed at the Miramar Mounds National Natural Landmark (Area U, Table 2) such is not the case, as evidenced by the vandalizing of the Landmark marker itself. Nowhere in San Diego County are vernal pools protected.

The destruction of vernal pools has, for the most part, been out of ignorance regarding the biological value of the resource. The directed destruction of pools in Areas H, C, D, and BB is an indication of future trends, not only for vernal pools but also other biological and archaeological resources of the area.

In order to obtain suitable areas for preservation, action must be taken soon. To provide a basis for action, the physical, biological, and land use characteristics of pool areas are analyzed and ranked in terms of feasibility and suitability of acquisition. Since several varying factors are involved, such as presence of threatened plants, soil type, associated vegetation, a

single, ranked list is not meaningful; ranking of sites within categories is presented.

The listings have been made after discussions with other field biologists familiar with vernal pool habitat and the current development trends in coastal San Diego County.

The following is a regional listing of sites which require protection in order to preserve the small remaining regional diversity of vernal pool habitat in San Diego County. No priority is inferred in the sequence because the variety of pool types should all be preserved. The areas vary in size and preservation of the entirety of the smaller sites should be considered, while with larger sites, significant representative areas should be preserved.

The regional listing is: Pendleton (Y), Ramona (T), San Marcos (L), Kearny Mesa (A, B, C, D, E, F, G, H, I, N, O, P, U, V, W, X, Z, AA, EE, FF, GG, and HH), Poway (CC and DD), Otay Mesa (J, K, and M), Sweetwater (S), and Grossmont (Q).

Because the highest threat now appears to be with the northern San Diego Mesa Pools, (referred to as Kearny Mesa above), a ranking within categories is here presented:

Biological Quality, including size and diversity of pool flora,

1st - D 2nd - U 3rd - AA 4th - H 5th - I 6th - C

In terms of threat of destruction, the following rating appears to reflect the current situation, however, because of the incredibly rapid rate at which unplanned development is occurring in the area, these relative ranks may change quickly, some pool areas being destroyed within a few weeks from the date of this report:

Threat of Destruction:

1 (highest) - H; 2 - C; 3 - I; 4 - P; 5 - D; 6 - AA; 7 - UU

In order to establish preservation of a representation of the biological diversity of vernal pool habitat on the Redding soils of Kearny Mesa, another ranking is proposed for the remaining private lands. Here, and only here, the assumption is made that federal land having vernal pool habitat is equivalent to protection. The intent of this ranking of private lands is to allow acquisition of an area which aids in preserving the regional diversity, especially the northern limit of distribution of the Redding soils pools. Involved in this ranking is consideration of the locations of lands adjacent to areas currently or soon to be administered by an agency as public land, locations not adjacent to developed lands, and locations defensible by virtue of their natural topographic barriers to human intrusion, especially by motor vehicles.

Acquisition Priority for Private Lands on Kearny Mesa

1st - H1-22; 2nd - H11-22, less 14 & 15; 3rd - H1-10 plus 14 & 15;
4th - I6; 5th - C17 & 18

With regard to public land; i.e., City of San Diego land at Montgomery Field, Navy land at Miramar NAS, Marine Corps land at Camp Pendleton and Sweetwater Authority lands at Sweetwater Lake, vernal pool habitat should be fenced and posted as to the value of the resource. Management programs should be established which include interpretive or educational programs, review of study uses in the area and exclusive preservation of portions of all sites from any uses, scientific or otherwise.

Separate from the preservation of the Redding soils-associated pool habitats are those in the Otay and San Marcos areas. These sites are large enough that preservation of a portion of the sites would still result in a viable preserve.

For the Otay Mesa vernal pool habitat the proposed ranking for acquisition is:

1st - J19, 21, 23-25, 27-30; 2nd - J23, 24, 27-30; 3rd - J27-30;
4th - J23, 24

For the San Marcos vernal pool habitat the proposed ranking is:

1st - L1-6 including a buffer to the east of 600 feet
2nd - L7-10

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS*

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO. OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
TIERRA SANTA	A-															
	3										3	70	3	1	CHP	CR
	4		x		x			x			33	700	2	2	CHP	CR
MIRA MESA NORTH	B 1		x		x						4	130	9	0	CHP	WL
	2		x								1	5	1	1	CHP	WL
	3								x		1	1	1	1	CHP	WL
	4	x	x		x			x			3	1350	5	1	CHP	WL
	5		x		x		x	x			1	900	8	0	CHP	PE
	6							x	x		1	100	3	0	CHP	PE
	7		x								3	1200	3	2	CHP	PE
	8		x								7	1500	7.5	1	CHP	PE
	9	x	x		x			x			3	500	9	1	CHP/Gr	WL
	10		x								2	50	4	1	CHP	WL
	11		x						x		5	60	3.5	1	CHP	PV
	12	x	x								3	100	8	3	CHP	PV
	13	x									2	50	3	0	CHP	PV
MIRA MESA CENTRAL	C 1	x	x		x			x			1	6000	9	1	GR/CHP	PV
	2	x			x			x			14	5600	19	2	CHP	PR
	3	x			x			x			7	400	7	1	CHP	PV
	4		x		x						1	15	2	0	CHP	PV
	5	x	x		x						2	1000	5	2	CHP	PR
	6	x	x		x			x	x		2	1500	8	3	CHP	PR
	7	x	x		x				x		4	1500	4	1	CHP	PR
	8		x		x			x			8	400	4	2	CHP/Br	PR
	9	x	x		x						9	300	7	1	CHP/Br	PV
	10	x			x						1	100	1	2	CHP/Br	PV
	11	x	x		x			x			4	300	3	2	CHP/Br	PV
	12		x		x						4	150	2.5	2	CHP/Br	PV
	13	x	x		x						8	800	4	3	CHP/Br	PV
	14	x	x		x						7	700	3.5	1	CHP/Br	PV
	15	x	x		x						8	800	4.5	3	CHP/Br	PV
	16	x	x		x			x			8	800	4	2	CHP/Br	PV

*Legend of names, associated vegetation and ownership categories follows table.

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO. OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
MIRA MESA CENTRAL	C17		x		x			x			17	2500	15	0	CHP	WL
	18		x					x			9	900	7	2	CHP	WL
	19	x	x						x		1	50	1	3	CHP	PV
	20	x	x					x			10	900	7	0	CHP	PV
	21	x	x					x			22	1250	15	1	CHP	PV
	22	x	x								13	800	12	1	CHP	PV
	23										9	450	7	0	CHP	PV
	24										9	425	9	0	CHP	PV
	25										4	400	10	0	CHP	PV
	26										9	500	5	2	CHP	PV
MIRA MESA SOUTH	D 1		x						x		3	1	2	0	CHP	FE
	2							x			1	14	1	0	CHP	FE
	3							x			1	35	1	1	CHP	FE
	4							x			1	2	1	0	CHP	FE
	5		x					x			3	30	2	2	CHP	FE
	6	x	x					x			7	210	3	1	CHP	FE
	7	x	x		x			x	x		12	600	7	0	CHP	FE/PR
	8	x	x					x			12	600	5	2	CHP	PR/FE
	9	x	x					x	x		4	200	3	2	CHP	PR
	10	x	x								7	525	3	1	CHP	PR
	11	x	x		x			x			7	525	6	1	CHP	PR
	12		x		x			x			14	2000	12	0	CHP	PR
	13		x								1	500	2	0	CHP	PR
	14		x		x			x			5	1800	5	0	CHP	PR
	15	x	x		x			x			7	1800	5	0	CHP	PR
	16		x		x						5	450	5	0	CHP	PR/FE
	17		x		x			x			14	700	8	1	CHP	PR
	18		x		x						3	210	11	2	CHP	PR
	19	x	x					x			8	200	3.5	1	CHP	PR
	20		x								15	1350	12	2	CHP	PR
	21		x								4	100	2.5	1	CHP	CO
	22	x	x								2	30	4	1	ISS	CO
	23	x									4	60	3	3	Di	CO

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO. OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
MIRA MESA SOUTH	D24	x	x								1	70	1.5	0	CHP	CO
	25	x	x		x						7	525	11	1	Di	CO
	26	x									1	500	1.5	3	Di	CO
	27	x	x								5	46	5	2	Di	CO
KEARNY VILLA SOUTH	E 1	x	x								10	400	9	3	ISS	PV
	2	x	x								2	325	2	2	ISS	PV
	3	x	x								1	30	1	1	ISS	PV
	4	x	x								16	700	11	1	ISS	PV
	5		x								1	400	2	2	ISS	PV
KEARNY VILLA NORTH	F 1	x	x		x			x			13	455	2.5	1	Gr	USN
	2	x	x		x						15	1125	5	0	Gr	USN
	3	x			x						4	300	3	0	Gr	USN
	4	x	x		x						7	70	4	1	Gr	USN
	5	x			x						5	400	2	0	Gr	USN
	6	x			x						1	200	0.5	0	Gr	USN
	7		x		x						4	400	1	0	Gr	USN
	8		x		x						6	50	1	1	Gr	USN
	9	x			x						4	75	2	0	Gr	USN
	10				x						5	300	3	0	Gr	USN
	11				x						3	150	4	0	Gr	USN
	12		x		x						4	200	2	1	Gr	USN
	13	x	x		x						18	450	6	0	Gr	USN
	14	x	x		x						19	475	8	0	Gr	USN
	15				x						1	240	1	0	Gr	USN
	16		x		x						8	300	6	1	ISS	USN
	17	x	x		x	x					19	150	7	1	CHP	USN
	18		x								1	300	2	3	CHP	USN
	19		x		x						2	100	2	1	CHP	USN
	20				x						2	80	1	1	CHP	USN
	21				x						2	400	3	1	CHP	USN
	22				x						2	70	1.5	0	CHP	USN

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO. OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
KEARNY VILLA NORTH	F23		x		x						18	2000	18	0	CHP	USN
	24				x						1	200	2	2	CHP	USN
	25				x						3	400	12	0	CHP	USN
	26				x						2	400	3	0	CHP	USN
	27				x						11	475	7	0	CHP	USN
	28										16	550	8	0	CHP	USN
TIERRA SANTA SOUTH	G 1		x					x		x	12	600	8	3	ISS	USN
PENASQUITOS NORTH	H 1	x									4	40	4	0	CHP	PV
	2							x			8	2000	10	0	CHP	PV
	3	x									3	100	4	0	CHP	PV
	4	x									4	400	3.5	2	CHP	PV
	5	x	x					x			7	2400	11	2	CHP	PV
	6	x	x		x						1	2000	3.5	1	CHP	PV
	7	x									6	1200	7	2	CHP	PV
	8								x		1	10	2	0	CHP	PV
	9	x						x		x	1	1200	6	0	CHP	PV
	10	x	x								1	2000	4	1	CHP	PV
	11								x		4	1	3	0	CHP	PE
	12	x									1	42	2	0	CHP	PE
	13	x							x		8	200	7	0	CHP	PE
	14								x		2	50	4	0	CHP	PV
	15	x							x		10	3000	12	1	CHP	PV
	-															
	17								x		1	40	3	1	CHP	PV
	18	x							x		1	450	5	1	CHP	PV
	19	x							x		1	3500	6	1	CHP	PV
	20	x							x		1	1200	5	1	CHP	PV
	21		x								7	140	6	1	CHP	PV
	22		x								5	55	6	1	CHP	PV
	23								x		3	34	3		CHP	PV

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO.OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
PENASQUITOS NORTH	H24	x	x						x		1	1600	8	1	CHP	PV
	25	x	x								5	2500	9	2	CHP/Gr	PV
	26	x	x								3	45	5		CHP	PV
	27		x								4	150	2.5	2	CHP	PV
	28		x								5	125	5		CHP	PE
	29	x	x					x			6	2000	7	0	CHP	PE
	30					x					1	20	1.5	2	ISS	PV
	31	x									1	16	1			PV
	32	x									1	900	3	1	ISS	PV
	33	x									2	140	14	1	CHP	PE
	34		x								5	450	4	0	CHP	PE
	35	x	x								24	1150	16	0	ISS	PV
MIRAMAR INDUSTRIAL	I 1	x	x		x			x			20	3500	12	0	CHP	FE
	2	x	x								18	1000	9	1	CHP	SE
	3	x	x						x		33	1500	11	2	Gr	SE
	4	x	x								11	700	4	1	CHP	SF
	5	x	x			x			x		30	2000	12	1	CHP	SF
	6	x	x			x			x		52	3000	23	1	Gr	PV
	7	x									5	2500	16	3	Gr	USN
	8	x	x			x					45	2800	8	0	CHP	KE
	9										1	32	2	2	CHP	PV
	10										1	200	3	1	ISS	PV
OTAY MESA	J 1	x									2	25	3	1	ISS	PV
	2	x									1	12	1	1	ISS	PV
	-															
	4										1	1	1	0	ISS	PV
	5	x									1	64	2	1	ISS	PV
	-															
	7										1	1	1	0	ISS	PV
	-															

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO. OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
OTAY MESA	J -															
	11						x				1	15	2	2	ISS	PV
	12	x					x				2	20	5	1	ISS	PV
	13	x					x				4	360	13	1	ISS	PV
	14			x							2	12	3	2	ISS	PV
	15	x									3	150	16	2	ISS	PV
	16	x									5	100	8	1	ISS	PV
	17	x									5	100	12	1	ISS	PV
	18	x									1	200	2	0	ISS	PV
	19	x					x				11	120	33	0	ISS	PV
	20	x								x	1	30	1	1	ISS	PV
	21	x		x						x	7	150	9	1	ISS	PV
	22	x				x					3	80	12	0	ISS	PV
	23	x		x							38	1	94	0	ISS	OR
	24	x		x							13	40	17	0	ISS	OR
	25			x							12	20	20	0	ISS	OR
	26	x		x							4	50	9	0	ISS	PV
	27	x		x		x					16	150	72	1	ISS	PV
	28	x		x		x	x				11	200	21	0	ISS	PV
	29	x					x				2	100	4	1	ISS	PV
	30	x		x							10	400	65	1	ISS	PV
	31	x					x				1	70	5	1	ISS	PV
OTAY RIVER	K -															
	2					x					1	16	1	0	ISS	OR
	3	x									2	40	10	0	ISS	PV
	4	x									5	100	17	0	ISS	PV
	5	x									6	8000	38	0	ISS	PV
	6									x	2	50	40	0	CHP	PV
	7									x	1	35	2	0	ISS	PV

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO.OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
PROCTOR VALLEY	R 1									x	1	50	5	1	CHP	PV
SWEETWATER LAKE	S 1					x					10	100	54	0	Gr	SW
	2					x					1	100	5	0	Gr	SW
	3					x					1	300	5	0	Gr	SW
RAMONA	T 1									x	1	50	3	0	Gr	PV
	2					x					1	75	4	0	Gr	PV
	3									x	1	25	1	0	Gr	PV
	4									x	2	70	5	1	Gr	PV
	5										1	115	8	0	Gr	PV
LANDMARK	U 1	x			x						10	1800	12	2	CHP	USN
	2	x	x								4	320	3	0	CHP	USN
	3	x	x		x						26	1500	11	0	Gr	USN
	4	x				x	x				5	8000	3	0	Gr	USN
	5		x		x						8	400	7	0	Gr	USN
	6	x	x		x						17	1700	12	0	ISS	USN
	7	x	x		x				x		63	4200	32	0	CHP	USN
	8	x	x								10	1200	12	1	CHP	USN
	9	x	x		x						8	1100	9	1	CHP	USN
	10	x	x		x						70	9500	46	1	CHP	USN
	11	x	x		x						24	1300	25	1	CHP	USN
	12	x	x		x						16	3500	25	1	CHP	USN
	13										2	700	6	3	ISS	USN
SIM J. HARRIS	V 1	x			x						1	110	2	1	CHP	USN
	2	x	x								8	400	5	2	CHP	USN
	3	x	x		x						7	425	7	2	Gr	USN
SOUTH MIRAMAR NAS	W 1	x	x		x						16	900	19	1	Gr	USN
	2										9	825	8	0	Gr	USN

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO.OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
SAN MARCOS	L 1	x			x	x					3	100	5	0	Gr	PV
	2	x			x						1	12	8	1	Gr	PV
	3	x									1	75	3	1	Gr	PV
	4	x									1	15	1	0	Gr	PV
	5	x									1	6	1	1	Gr	PV
	6	x									1	40	1	1	Gr	PV
	7	x									2	66	4	1	Gr	PV
	8	x									2	66	4	1	Gr	PV
	9	x				x					1	200	3	1	Gr	PV
	10	x				x					4	175	4	0	Gr	PV
	11	x				x					2	10	5	0	Gr	PV
	12	x				x					2	120	1.5	0	Gr	PV
	13	x				x					3	80	2.5	0	Gr	PV
CHULA VISTA	M -															
	2					x					2	500	18	1	ISS	PV
	3										4	25	7	1	ISS	PV
	4										7		9			
MONTGOMERY FIELD	N 1		x		x						13	1500	7	1	Gr	SD
	2		x								20	2000	16	1	ISS	SD/PV
	3		x		x						10	1500	16	0	Gr	SD
	4		x		x						28	2000	26	0	Gr	SD/PV
	5		x								4	600	5	1	Gr	PV
	6		x			x		x			34	3000	31	1	Gr/Di	SD/PV
MISSION VILLAGE	O 1	x									6	100	4	3	ISS	PV
CAMINO RUIZ	P 1	x	x								34	3200	25	1	CHP	PV
	2	x	x					x			3	300	9	2	CHP	PV
GROSSMONT COLLEGE	Q 1										6	80	19	1	CHP	PV

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO. OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
SOUTH MIRAMAR NAS	W 3										34	1575	16	0	Gr	USN
	4										3	400	3	1	Gr	USN
WEST MIRAMAR NAS	X 1		x								2	40	1.5	3	CHP	USN
	2	x									2	100	2.0	2	CHP	USN
	3	x	x								2	300	4	2	CHP/Gr	USN
	4	x									48	5700	32	1	Gr	USN
PENDLETON	Y 1	x									1	6	2	2	Gr	USMC
	2	x									1	30	1	2	Gr	USMC
	3	x									1	2	1	2	Gr	USMC
	4	x									1	5	1	2	Gr	USMC
WEST GATE MIRAMAR NAS	Z 1		x								8	5852	5	0	Gr	USN
	2	x	x								5	7000	5	0	CHP	USN
	3	x	x								70	17000	20	0	CHP	USN
	4	x	x					x			4	600	2.5	2	ISS	USN
	5										3	105	1.5	2	ISS	USN
	6	x									1	150	2	3	Gr	USN
	7	x									4	225	5	1	Gr	USN
	8			x							1	8	1	3	Gr	USN
EAST MIRAMAR NAS	AA 1	x	x	x							5	600	4	2	ISS	USN
	2		x	x							1	1500	20	0	Gr	USN
	3	x	x	x				x			16	1200	12	0	CHP	USN
	4	x	x	x				x			56	900	25	0	CHP	USN
	5	x	x					x			17	400	15	1	CHP/ISS	USN
	6	x	x	x				x			28	700	11	1	CHP	USN
	7	x	x	x				x			30	1000	17	0	CHP	USN
MISSILE ROAD	BB 1	x	x	x				x			9	150	3	2	ISS	PV

TABLE 1. POOL COMPOSITION WITHIN REGIONS/AREAS (cont.)

REGIONAL NAME	POOL CODE	EA	PA	PN	BO	NF	OC	IO	MF	MA	NO.OF POOLS	EST. POOL AREA (m^2)	WATERSHED AREA IN ACRES	DISTURB. FACTOR	ASSOC. VEGET.	OWNER
POMERADO ROAD	CC1										2	16	1	1	ISS	DC
	2										10	800	10	1	ISS	PV
	3										1	75	8	0	Gr	PV
	4										1	40	1		Gr	PV
	5										2	80	2	0	ISS	PV
	6										6	250	10	1	ISS	PV
	7										16	750	22	2	ISS	PV
RANCHO BERNARDO	DD1					x					3	125	15	0	ISS	PV
	2										5	150	5	1		PV
	3										4	75	6	1	ISS	PV
	4										3	90	6	0	ISS	PV
UNMAPPED-1	EE												270			USN
UNMAPPED-2	FF												85			USN
UNMAPPED-3	GG												48			USN
UNMAPPED-4	HH												70			USN

TABLE 1. LEGEND

SPECIES NAMES

EA - Eryngium aristulatum var. parishii
PA - Pogogyne abramsii
PN - Pogogyne nudiuscula
BO - Brodiaea orcuttii
NF - Navarretia fossalis
OC - Orcuttia californica
IO - Isoetes orcuttii
MF - Myosurus minimus var. filiformis
MA - Myosurus minimus var. apus

ASSOCIATED VEGETATION

Br - Brushed
CHP- Chamise, Chaparral
Di - Disced
Dt - Disturbed
Gr - Grassland
ISS- Scrub

OWNERSHIP

CO - ConRock
CR - Christiana Companies, Inc.
DA - Daley Corporation
FE - Fenton Material Co.
KE - Kendall
OR - Otay Ranch
PR - Pardee
PE - Penasquitos, Inc.
PV - Private
SD - City of San Diego
SW - Sweetwater Authority
SF - Santa Fe Land Improvement Co.
USMC - Unites States Marine Corps.
USN - United States Navy
WL - William Lyons Property Co.

- indicates unused pool sector number

(20) Underlining indicates pool areas destroyed during the survey.

DISTURBANCE FACTOR
-see Table 6 for criteria

TABLE 2. REGIONAL ACREAGES AND ASSOCIATED FEATURES*

SECTOR	Total pools ( ) at start of survey	Total watershed in acres	Soil Series	Jurisdiction	Federal Presence
A Tierra Santa	36	5	Redding	SDc	VA/FHA
B Mira Mesa North	36	65	Redding	SDc	VA/FHA
C Mira Mesa Central	(191) 152	(175) 128	Redding	Coast Comm. SDc	VA/FHA
D Mira Mesa South	(154) 52	(126) 45	Redding	SDc	VA/FHA
E Kearny Villa South	(30) 10	(25) 9	Redding	SDc	SBA
F Kearny Villa North	196	117	Redding	USN	USN
G Tierra Santa South	12	8	Redding	USN/SDc	USN
H Penasquitos North	(147) 117	(192) 149	Redding, Olivenhain	SDc	VA/FHA
I Miramar Industrial	(216) 171	(100) 92	Redding	SDc/USN	SBA/USN
J Otay Mesa	158	431	Huerhuero, Stockpen	SDC/SDc	FAA/IBWC FHwA
K Otay River	17	108	Huerhuero Olivehain	SDC	-
L San Marcos	24	43	Las Flores,Placentia Ramona	SM	SBA
M Chula Vista	13	34	Olivenhain	SDC/ CV	VA/FHA
N Montgomery Field	109	101	Redding	SDc	FAA
O Mission Village	6	4	Redding	SDc	-
P Camino Ruiz	37	34	Redding	SDc	SBA
Q Grossmont College	6	19	Redding	SDC	-
R Proctor Valley	1	5	Olivenhain	SDC	-

*Legend follows table.

TABLE 2. REGIONAL ACREAGES AND ASSOCIATED FEATURES (cont.)

SECTOR	Total pools ( ) at start of survey	Total watershed in acres	Soil Series	Jurisdiction	Federal Presence
S Sweetwater Lake	12	64	Olivenhain	SwAu/SDC	-
T Ramona	6	21	Placentia,Bosanko	SDC	FAA
U Landmark	263	203	Bonsall-Fallbrook Redding	USN	USN
V Sim J. Harris	16	14	Redding	USN	USN
W South Miramar NAS	62	46	Redding	USN/SDc	USN
X West Miramar NAS	54	39	Redding	USN	USN
Y Pendleton	4	5	Huerhuero,Diablo	USMC	USMC
Z West Gate Miramar NAS	96	42	Redding	USN	USN
AA East Miramar NAS	153	104	Redding	USN	USN/FHwA
BB Missile Road	(9) 0	(3) 0	Redding	SDc	SBA
CC Pomerado Road	38	54	Olivenhain	SDC/SDc	VA/FHA
DD Rancho Bernardo	15	32	Huerhuero, Olivenhain	SDc	SBA
EE Miramar NAS runway		270	Redding	USN	USN
FF Miramar NAS runway		85	Redding	USN	USN
GG Miramar NAS runway		48	Redding	USN	USN
HH Miramar NAS runway		70	Redding	USN	USN
TOTAL	(2117) 1890				

TABLE 2. REGIONAL ACREAGES AND ASSOCIATED FEATURES (cont.)

Legend: SDc= City of San Diego

SDC= County of San Diego

Coast Comm.= San Diego Regional Coastal Commission

USN= United States Navy; Miramar Naval Air Station

SM= City of San Marcos

CV=City of Chula Vista

SwAu= Sweetwater Authority

USMC=United States Marine Corps, Camp Pendleton

VA=Veterans Administration

FHA=Federal Housing Administration

SBA=Small Business Administration

USN=United States Navy

FAA=Federal Aviation Administration

IBWC=International Boundary and Water Commission

FHwA=Federal HIghway Administration

Total Pools: The figure in parenthesis is acreage at initiation of study, the figure to the right is acreage at end of study. The differences is acreage lost during the study.

TABLE 3. Comparisons of Estimated Original Vernal Pool Acreage and Current Extent.

REGION	SECTOR CODE	ESTIMATED EXTENT PRIOR TO 1850	EXTENT AS OF 1 July,1978	EXTENT AS OF 15 Mar,1979
Otay Mesa	J	2700	431	431
Otay Ranch	K,M,R	200	147	147
Encanto	-	550	0	0
Sweetwater Lake	S	90	64	64
East San Diego	-	4300	0	0
Fletcher Hills	Q	150	19	19
Santee	-	80	0	0
Grantville	-	480	0	0
Tierra Santa	A,G	450	13	13
Murphy Canyon	AA	100	104	104
Linda Vista	O,N,E BB	8500	133	114
Tecolote Ridge	-	300	1	1
South Miramar	F,U.V,W.EE, FF,GG,HH	1800	853	853
Rose Canyon	X,I,Z,P	2200	210	202
La Jolla Village	X	350	5	5
Mira Mesa	C,D,B	2800	366	238
Penasquitos	H	200	192	149
Pomerado Road	CC,DD	85	86	86
Ramona	T	500	21	21

TABLE 3. Comparisons of Estimated Original Vernal Pool Acreage and Current Extent. (Continued)

REGION	SECTOR CODE	ESTIMATED EXTENT PRIOR TO 1850	EXTENT AS OF 1 July, 1978	EXTENT AS OF 15 Mar.1979
San Marcos	L	260	43	43
Oceanside-Pendleton	Y	2500	5	5

Estimate of original extent - 28,595 acres

Acreage surveyed as of 1 July, 1978 - 2692 acres

Acreage destroyed during the survey 1 May, 1978 to 15 March, 1979 - 198 acres

Acreage remaining as of 15 March , 1979 - 2494 acres

Percent of vernal pool habitat destroyed during ten months of survey - 7.4%

Present percentage of remaining vernal pool habitat based upon estimated original extent - 8.7%

TABLE 4. Remaining Vernal Pool Habitat According to Soil Types

REDDING	1678
HUERHUERO	422
OLIVENHAIN	268
RAMONA	15
STOCKPEN	81
LAS FLORES	13
PLACENTIA	21
BOSANKO	7
BONSALL-FALLBROOK	8
DIABLO	3
	2494 acres

TABLE 5. Remaining Vernal Pool Habitat by Public Agency Jurisdiction

City of San Diego	814
San Diego County	625
United States Navy	1138
Coastal Commission	40
San Marcos	43
Chula Vista	15
Sweetwater Authority	64
Unites States Marine Corps	5

(Total is more than 2516 acres due to overlapping of jurisdiction.)

Table 6. Criteria for Disturbance Ratings assigned to Pool Sectors

0 - No recent disturbance, possible past discing clearing etc, not immediately evident.

1 - Disturbance present but not significant enough to disrupt the entire pool system or only a small portion of the pool area disturbed badly.

2 - Disturbance significant enough to reduce rare plant populations area in pools by up to 50%.

3 - Extremely disturbed with over half of the pool area lacking sensitive plant taxa or highly disturbed by heavy dumping filling, etc. This does not include dirt road in the vicinity of pools.

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State of California
THE RESOURCES AGENCY
Department of Fish and Game

DOLOHAN

ATTACHMENT

TO

SAN DIEGO VERNAL POOL STUDY, 1978[1/]

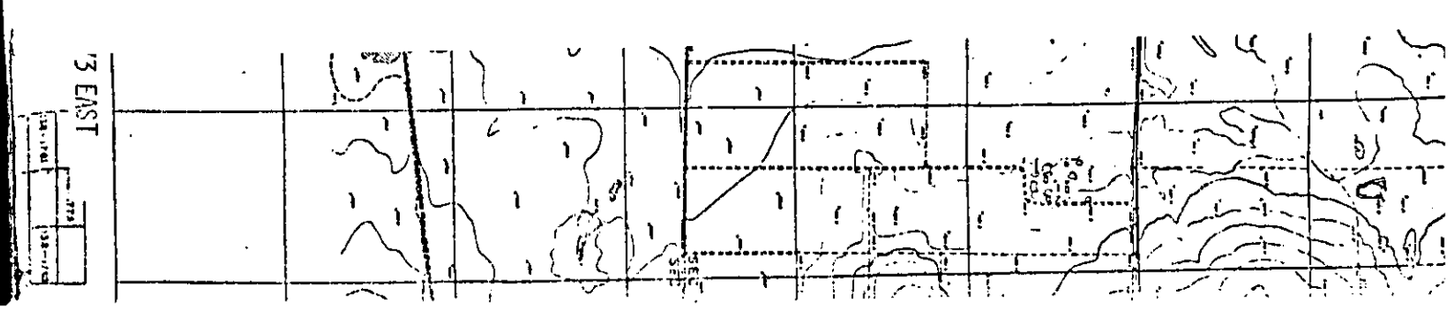
by

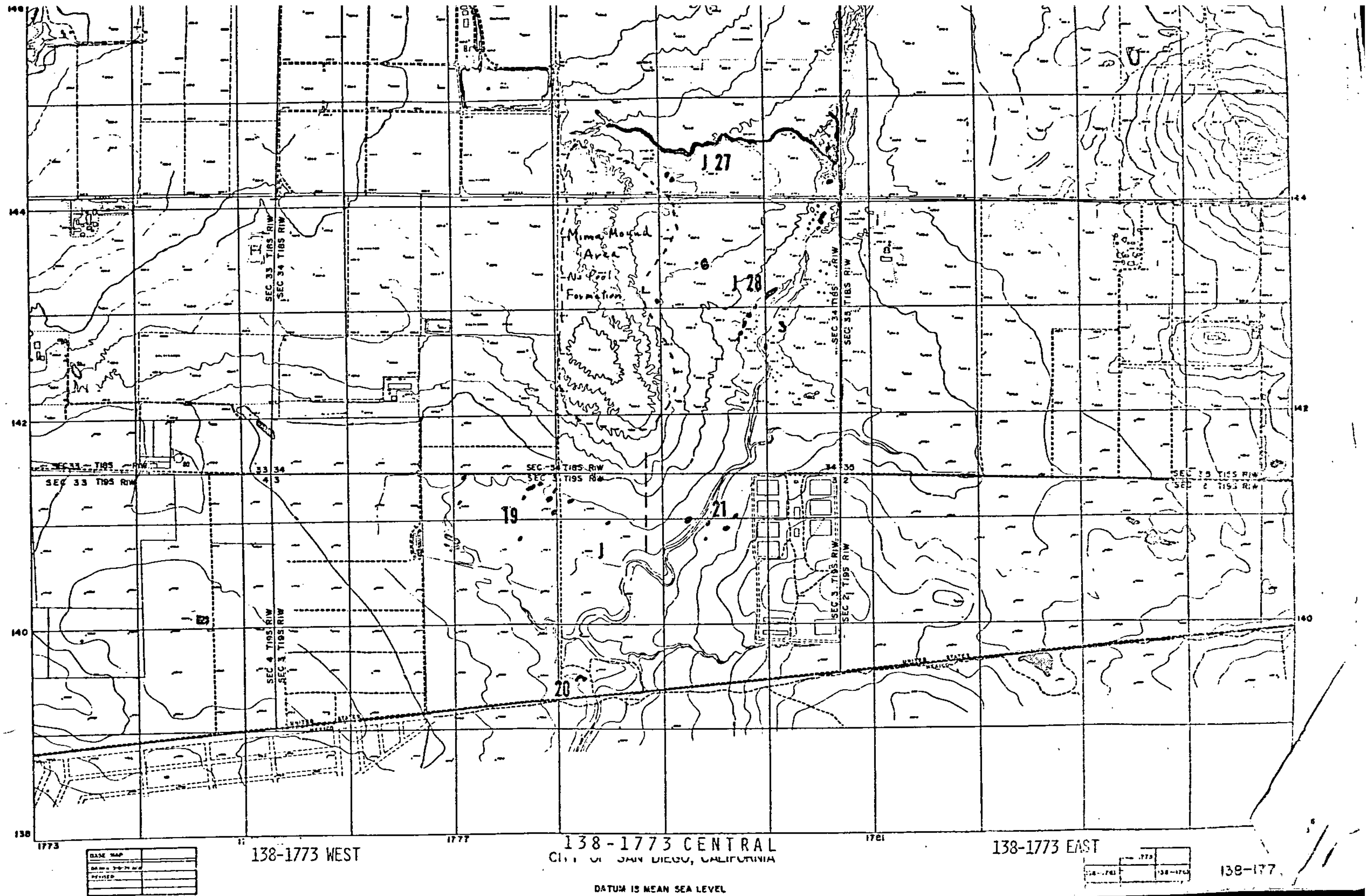
R. Mitchel Beauchamp, President
Pacific Southwest Biological Services, Inc.

ABSTRACT

The sensitive nature of threatened plant distributional data and the rate of habitat loss of vernal pools in San Diego County suggest that general distribution of site-specific data may be detrimental to the continued existence of the plants. The attachment contains the 1" = 800' maps corresponding to areas indicated within Figure 3 of the Study.

1/ Supported by Endangered Plant Program, 145, Nongame Wildlife Investigations, California Department of Fish and Game, Job I-1.0, Job Final Report (August 1979).





Mima Mound Area
No Pool Formation
J 27
J 28
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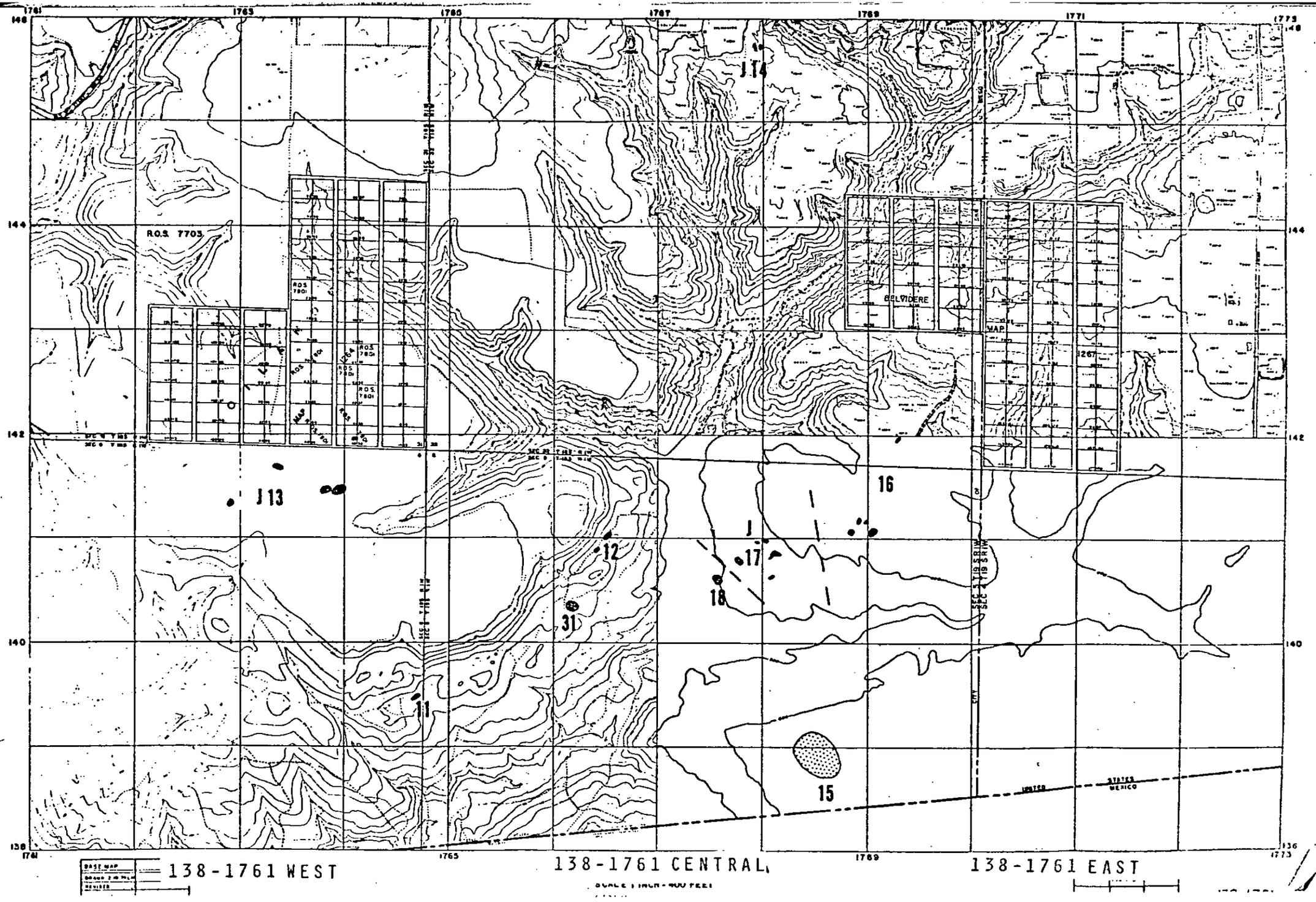
20
21
SEC 33 T18S R1W
SEC 34 T18S R1W
SEC 33 T19S R1W
SEC 34 T19S R1W
SEC 4 T19S R1W
SEC 3 T19S R1W
SEC 2 T19S R1W
SEC 35 T18S R1W
UNITED STATES
MEXICO
138-1773 WEST
138-1773 CENTRAL
CITY OF SAN DIEGO, CALIFORNIA
138-1773 EAST
DATUM IS MEAN SEA LEVEL
138-177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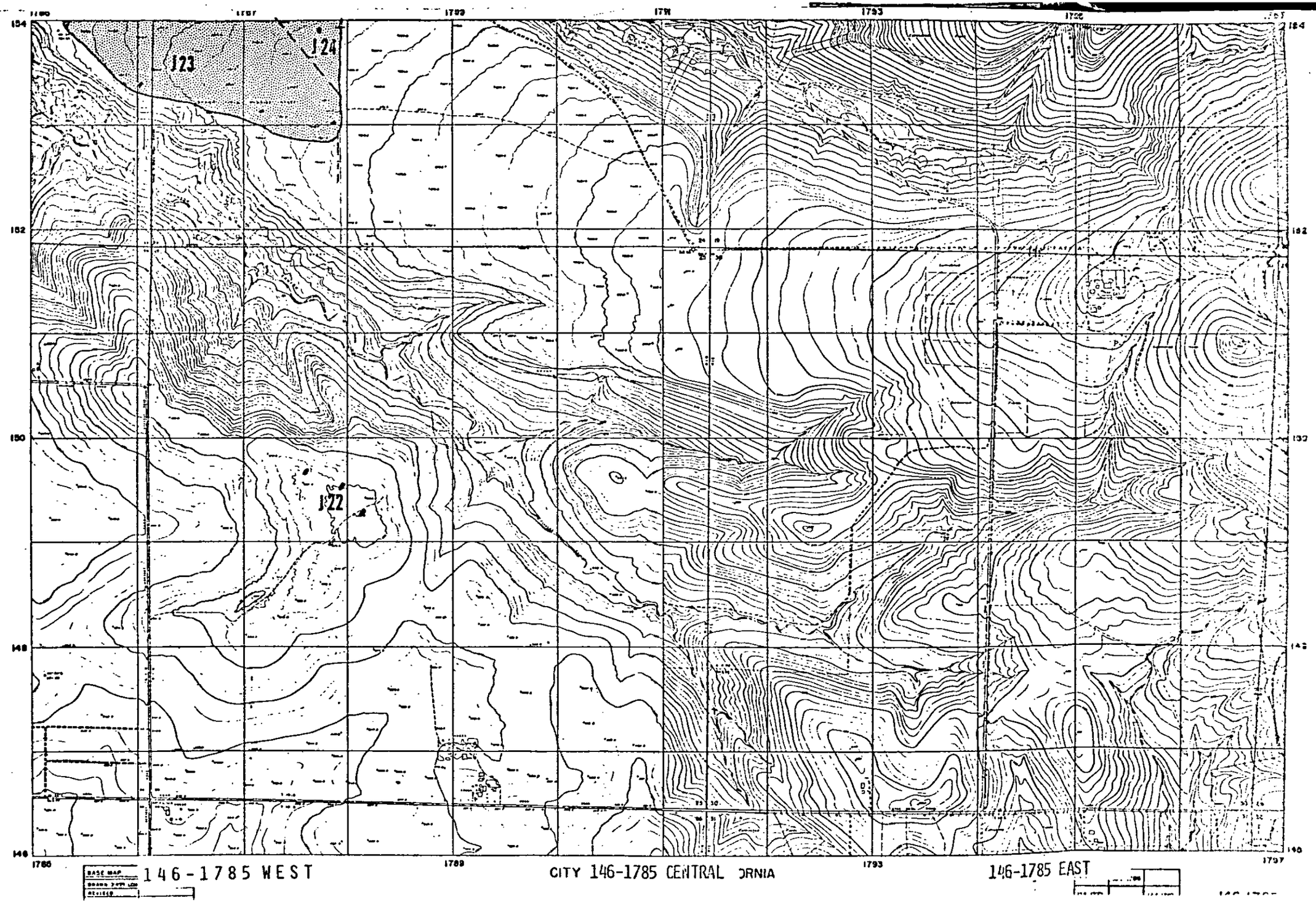
138-1761 EAST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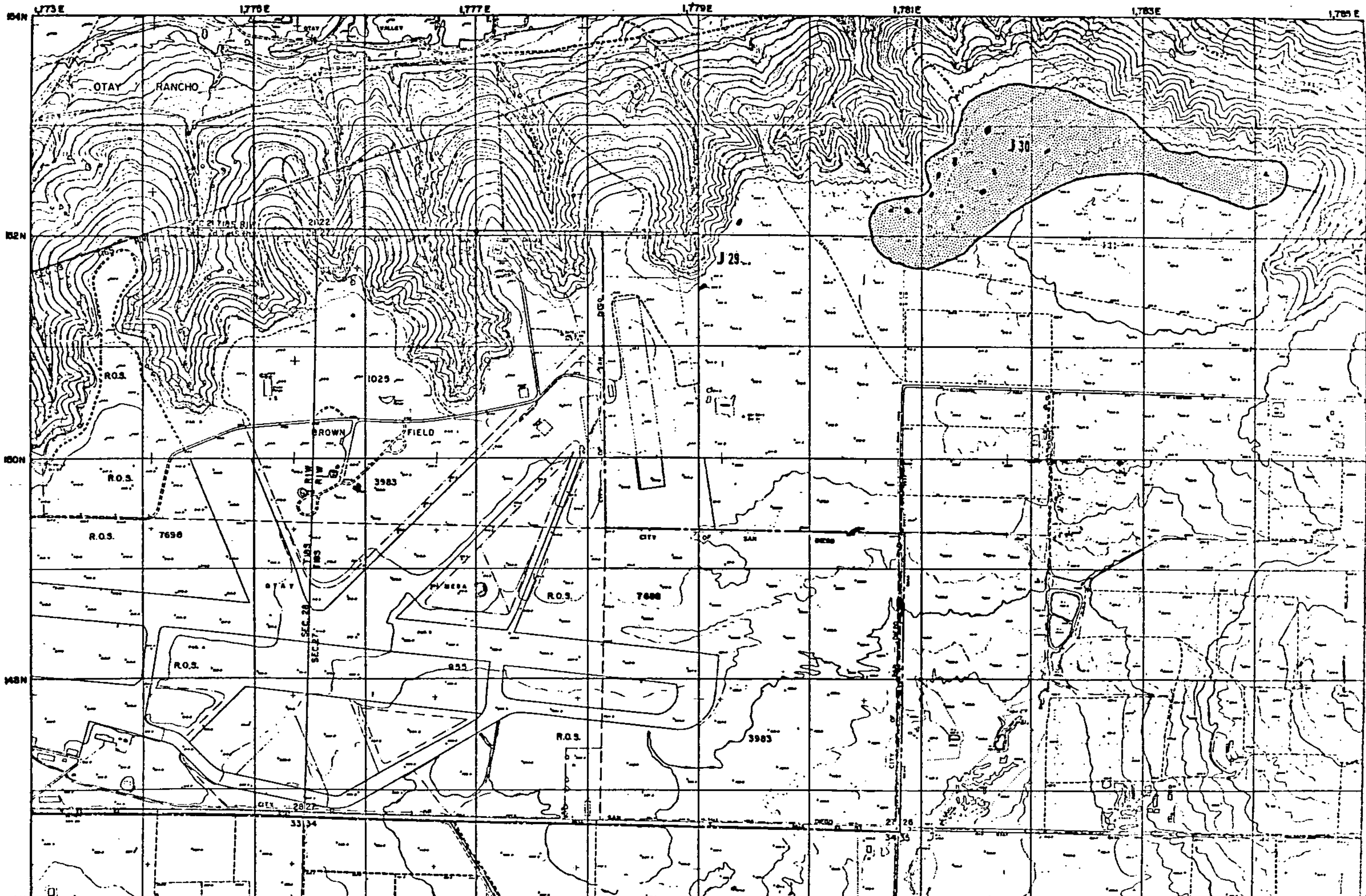

146-1773 WEST

CI 146-1773 CENTRAL

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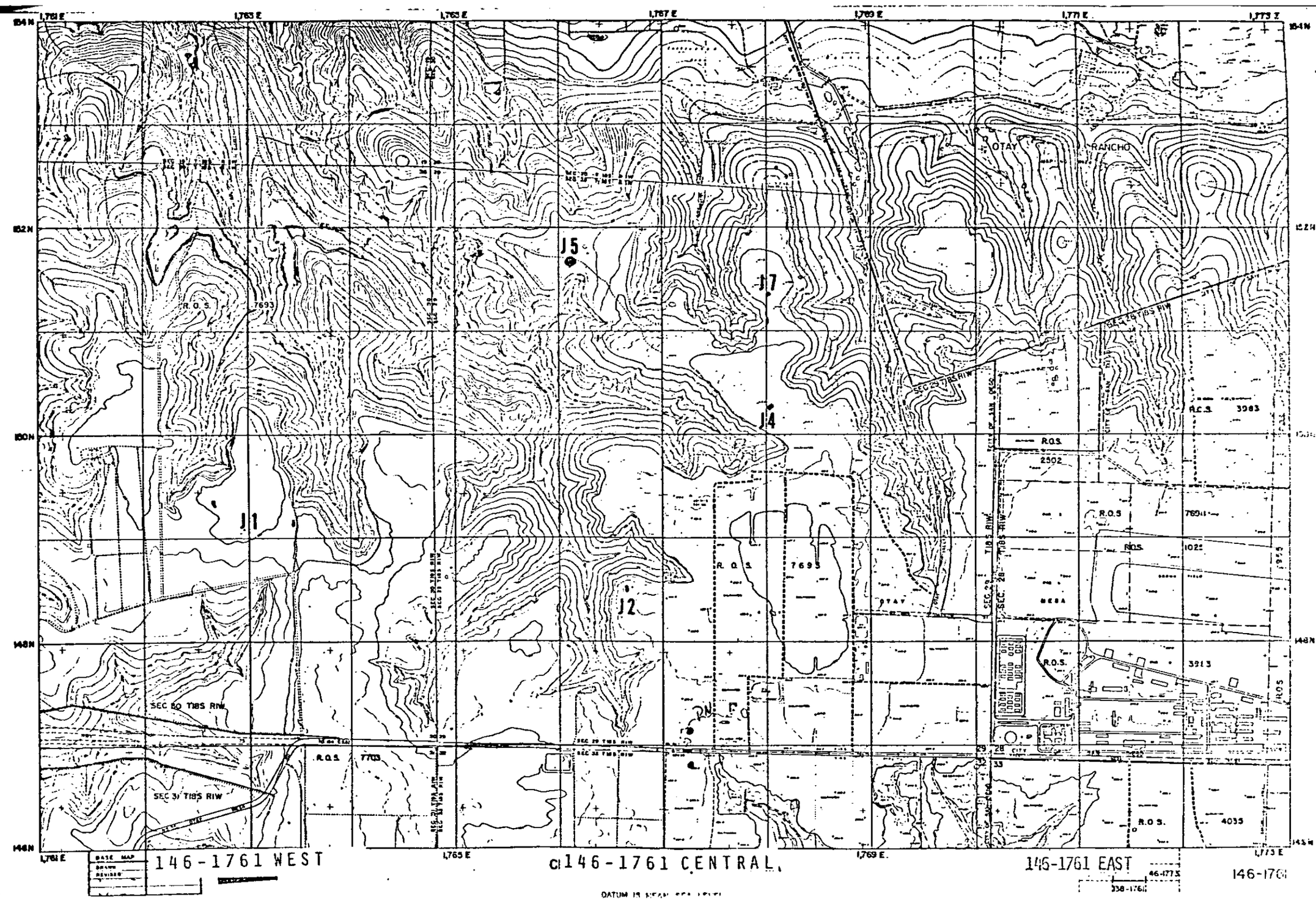
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J5
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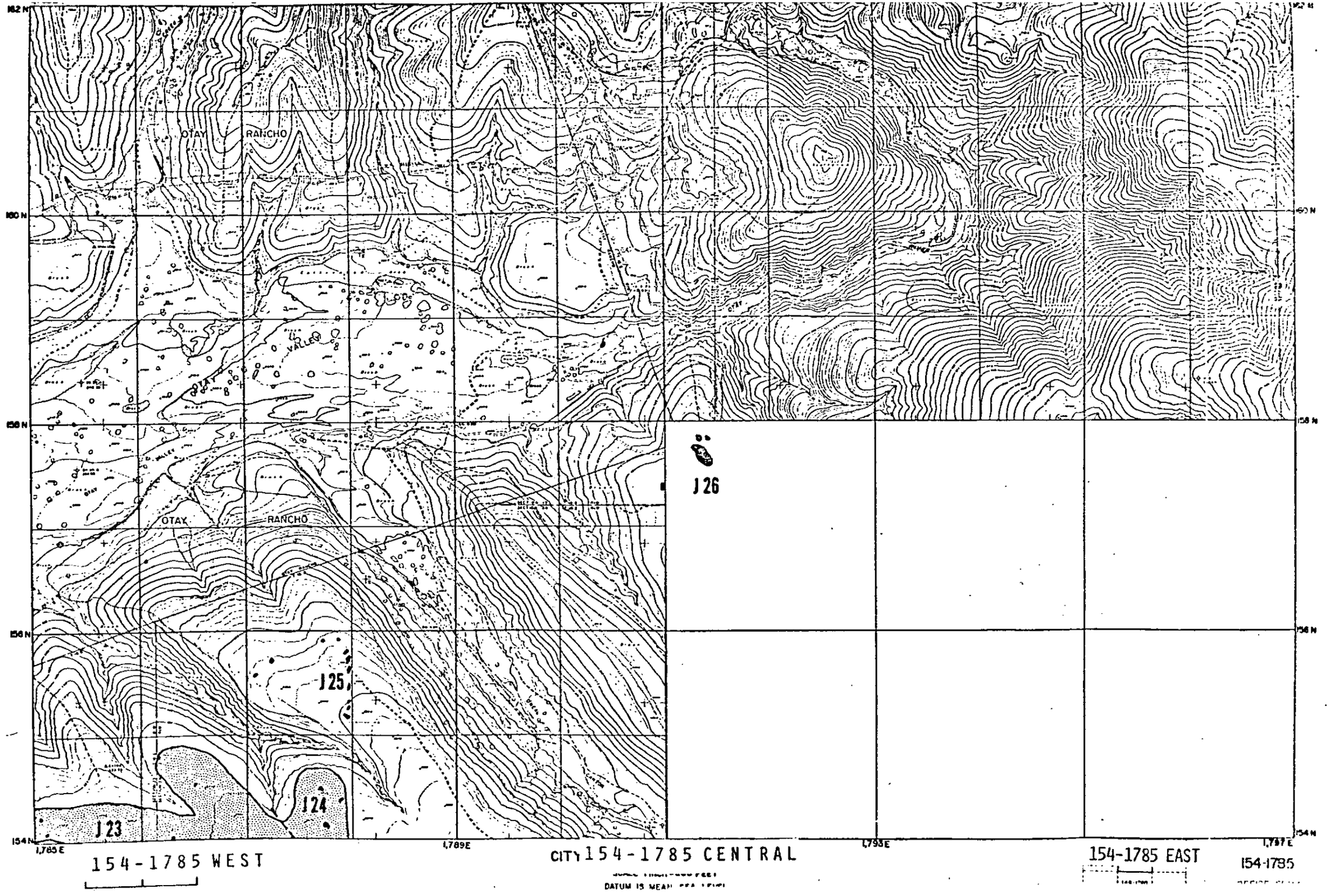
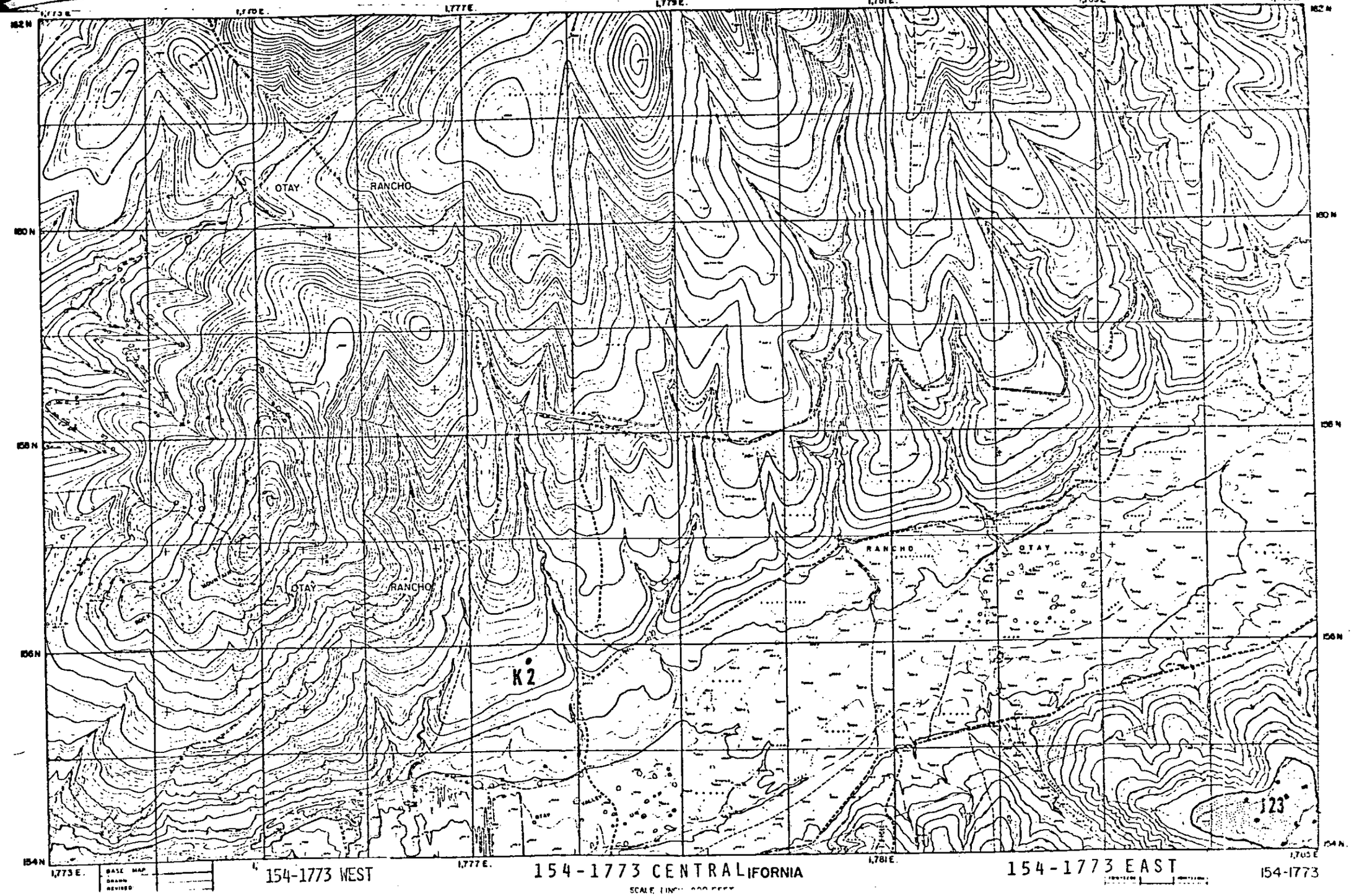
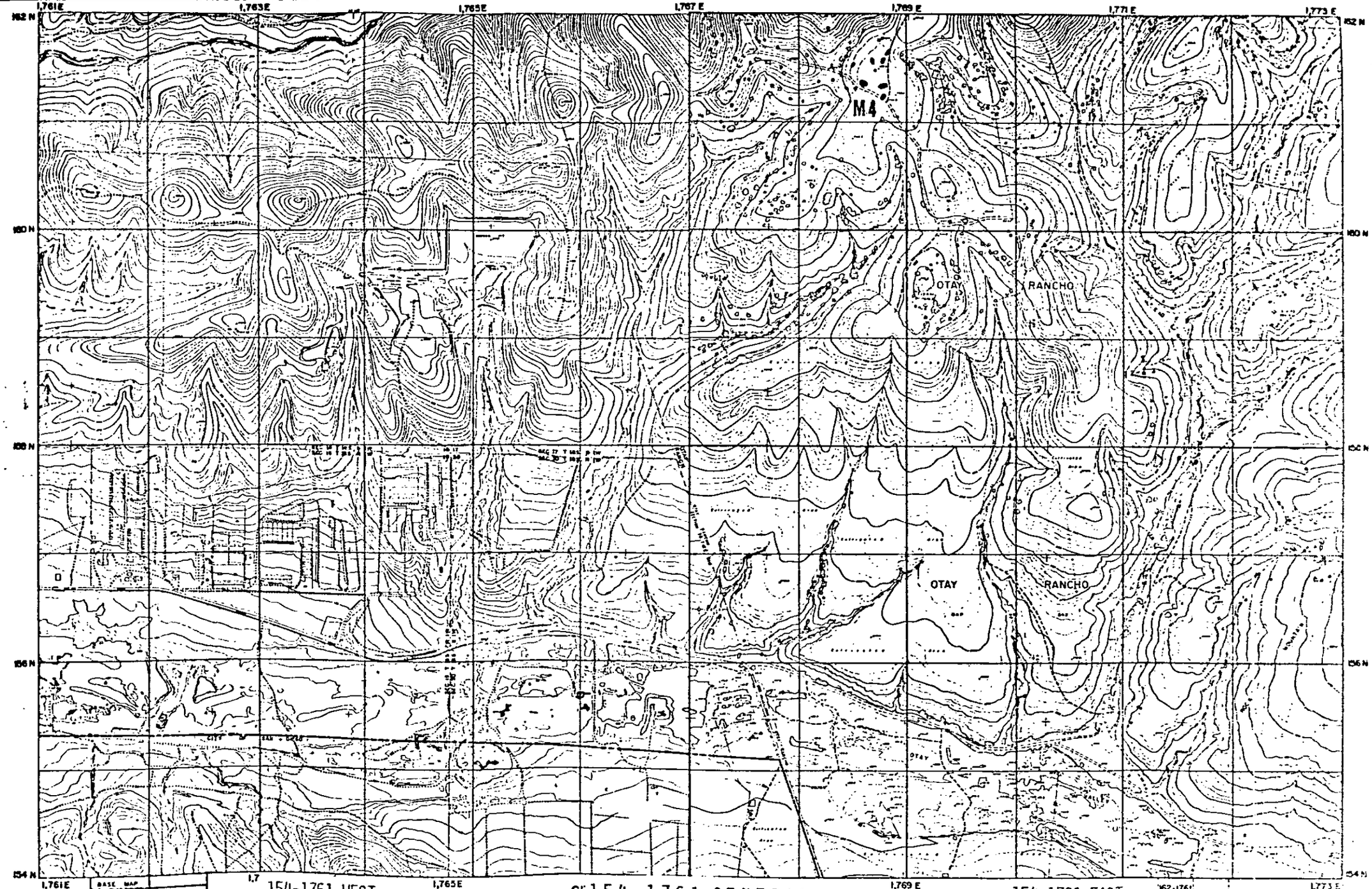
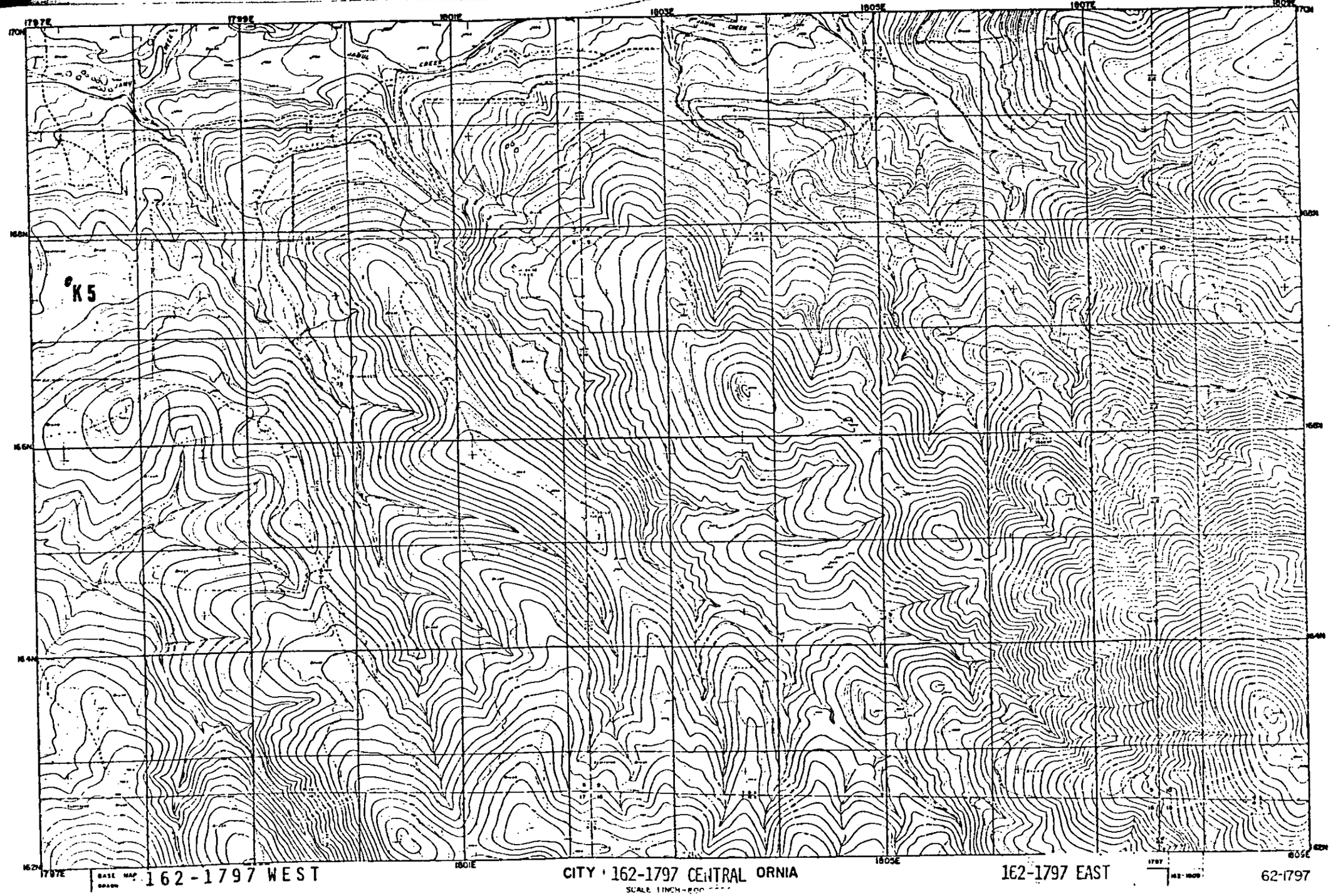
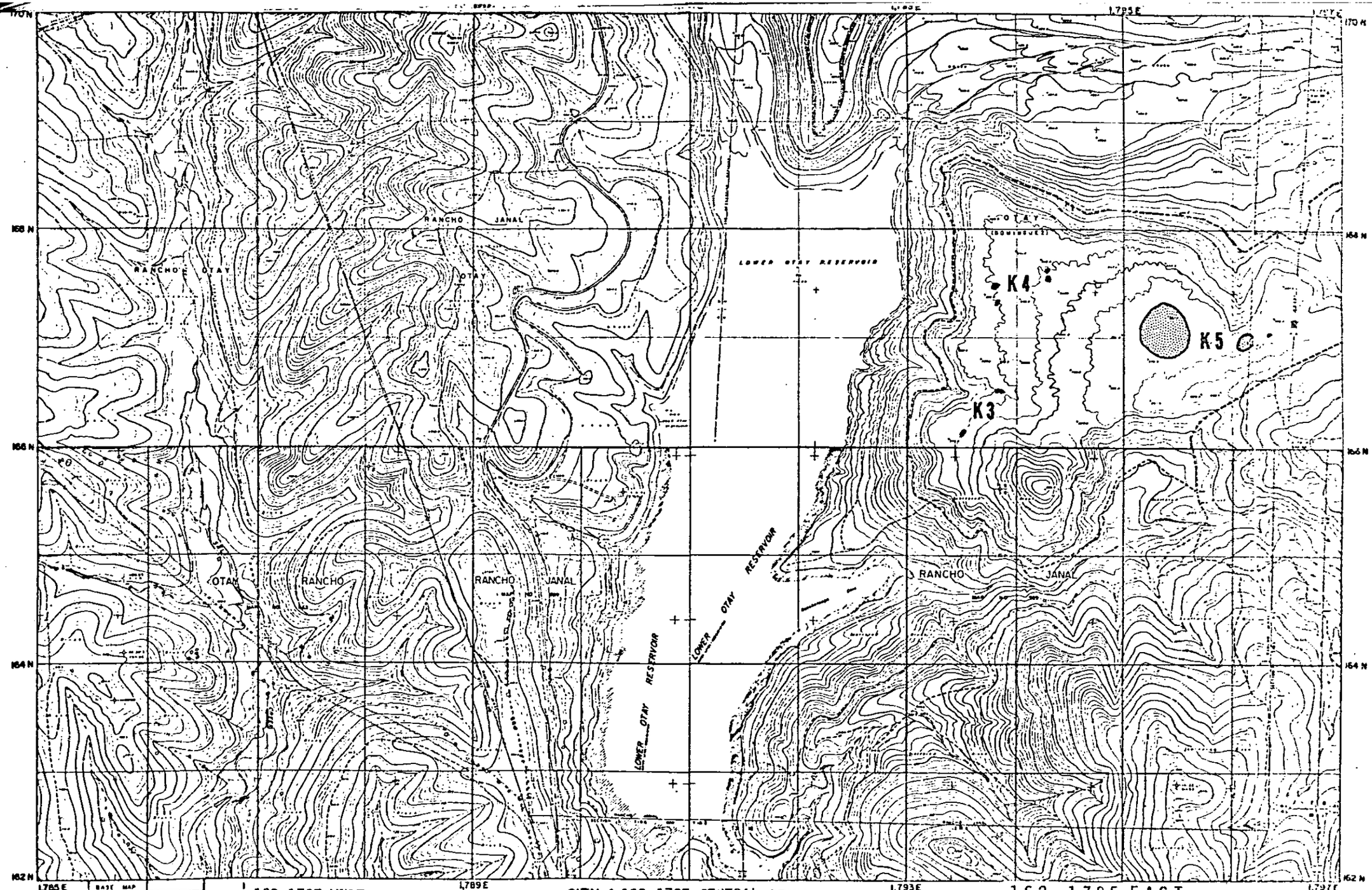
R.O.S. 7693
R.O.S. 7703
R.O.S. 3983
R.O.S. 2502
R.O.S. 7691
R.O.S. 1025
R.O.S. 3913
R.O.S. 4035
SEC 20 T18S R1W
SEC 29 T18S R1W
SEC 31 T18S R1W
SEC 32 T18S R1W
SEC 33 T18S R1W
RANCHO OTAY
OTAY MESA
146-1761 WEST
146-1761 CENTRAL
146-1761 EAST
146-1761
DATUM IS MEAN SEA LEVEL


162 N
160 N
158 N
156 N
154 N
1,785 E
1,789 E
1,793 E
1,797 E
OTAY
RANCHO
VALLEY
J 23
J 24
J 25
J 26
154-1785 WEST
CITY 154-1785 CENTRAL
154-1785 EAST
154-1785
DATUM IS MEAN SEA LEVEL


1,773 E.
1,775 E.
1,777 E.
1,779 E.
1,781 E.
1,783 E.
1,785 E.
162 N
160 N
158 N
156 N
154 N
OTAY
RANCHO
K2
123
154-1773 WEST
154-1773 CENTRAL IFORNIA
154-1773 EAST
154-1773


1,761E
1,763E
1,765E
1,767 E
1,769 E
1,771 E
1,773 E
162 N
160 N
158 N
156 N
154 N
M4
OTAY
RANCHO
OTAY
RANCHO
154-1761 WEST
JULY 72
154-1761 CENTRAL
154-1761 EAST
154-1761


1797E
1799E
1801E
1803E
1805E
170N
168N
166N
164N
162N
K5
162-1797 WEST
CITY · 162-1797 CENTRAL ORNIA
162-1797 EAST
62-1797



162-1785 WEST

CITY C 162-1785 CENTRAL ORNIA

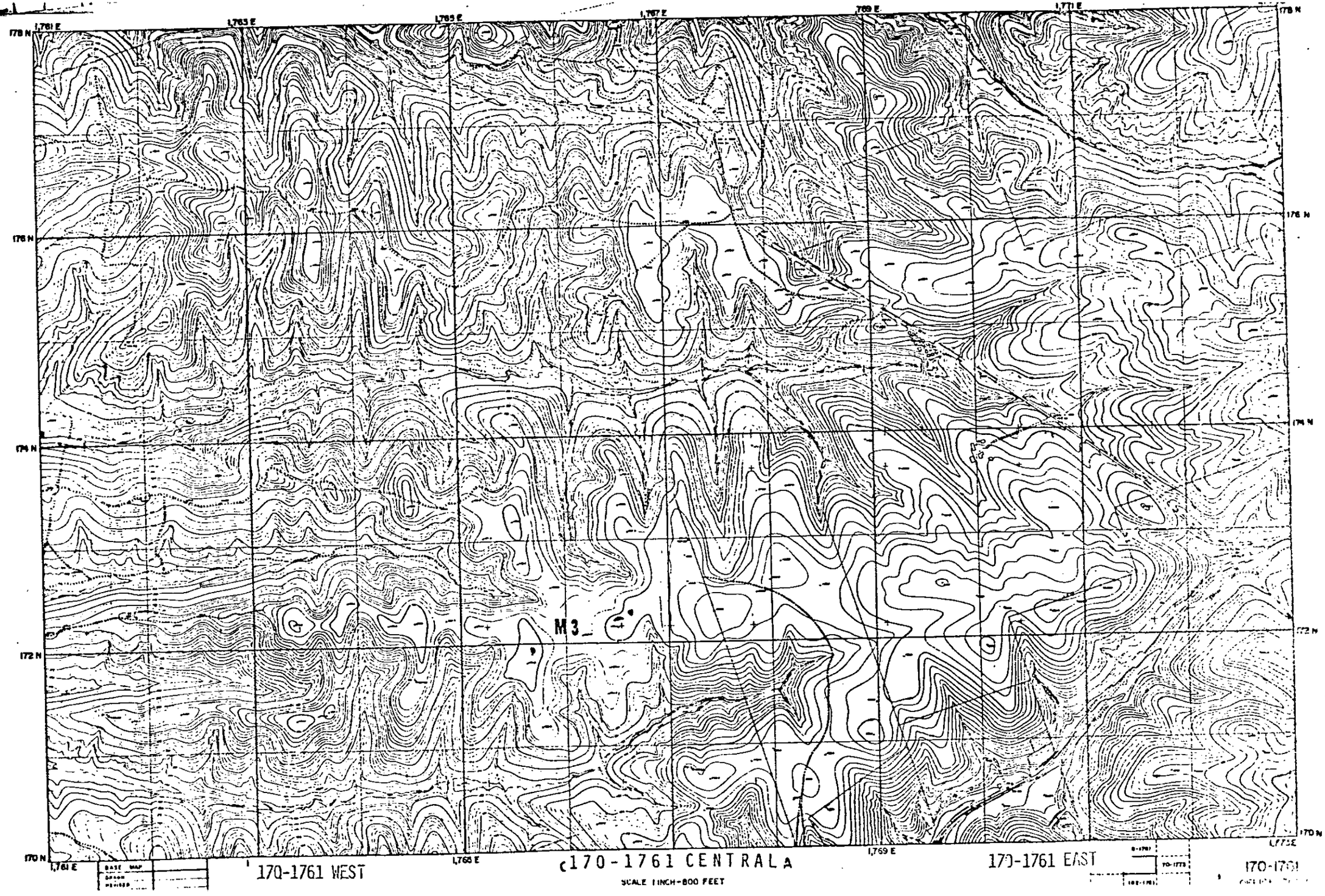
SCALE 1 INCH = 800 FEET

DATUM IS MEAN SEA LEVEL

162 - 1785 EAST

162-1785


1,761 E
1,763 E
1,765 E
1,767E
1,769E
1,771E
1,773E
170 N
168 N
166 N
164 N
162 N
M3
M2
RANCHO LA NACION
OTAY RANCHO
162-1761 WEST
c162-1761 CENTRAL
162-1761 EAST
SCALE 1 INCH = 800 FEET
162-1761

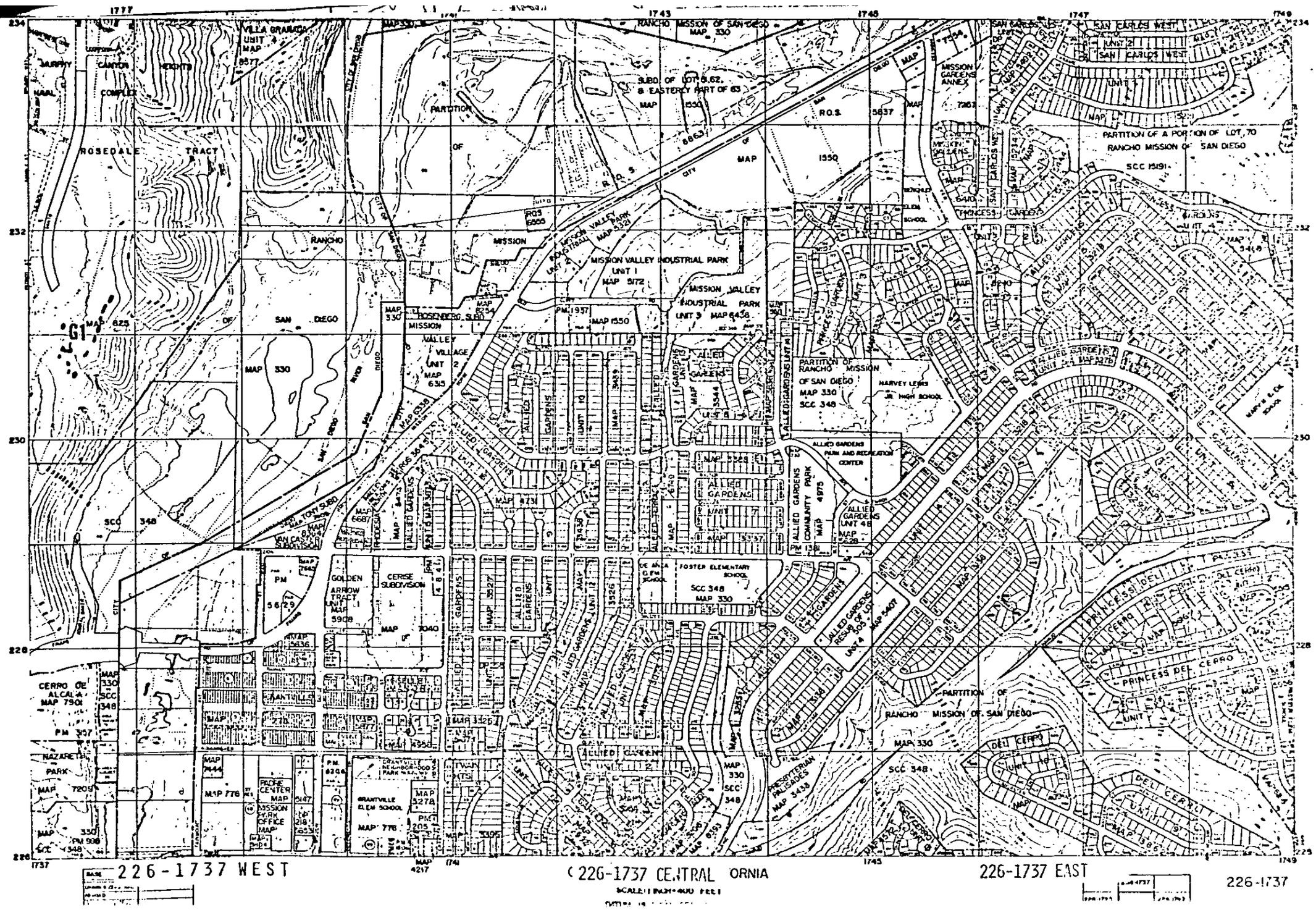

1,761 E
1,763 E
1,765 E
1,767 E
1,769 E
1,771 E
178 N
176 N
174 N
172 N
170 N
M3
170-1761 WEST
170-1761 CENTRAL A
170-1761 EAST
SCALE 1 INCH = 800 FEET

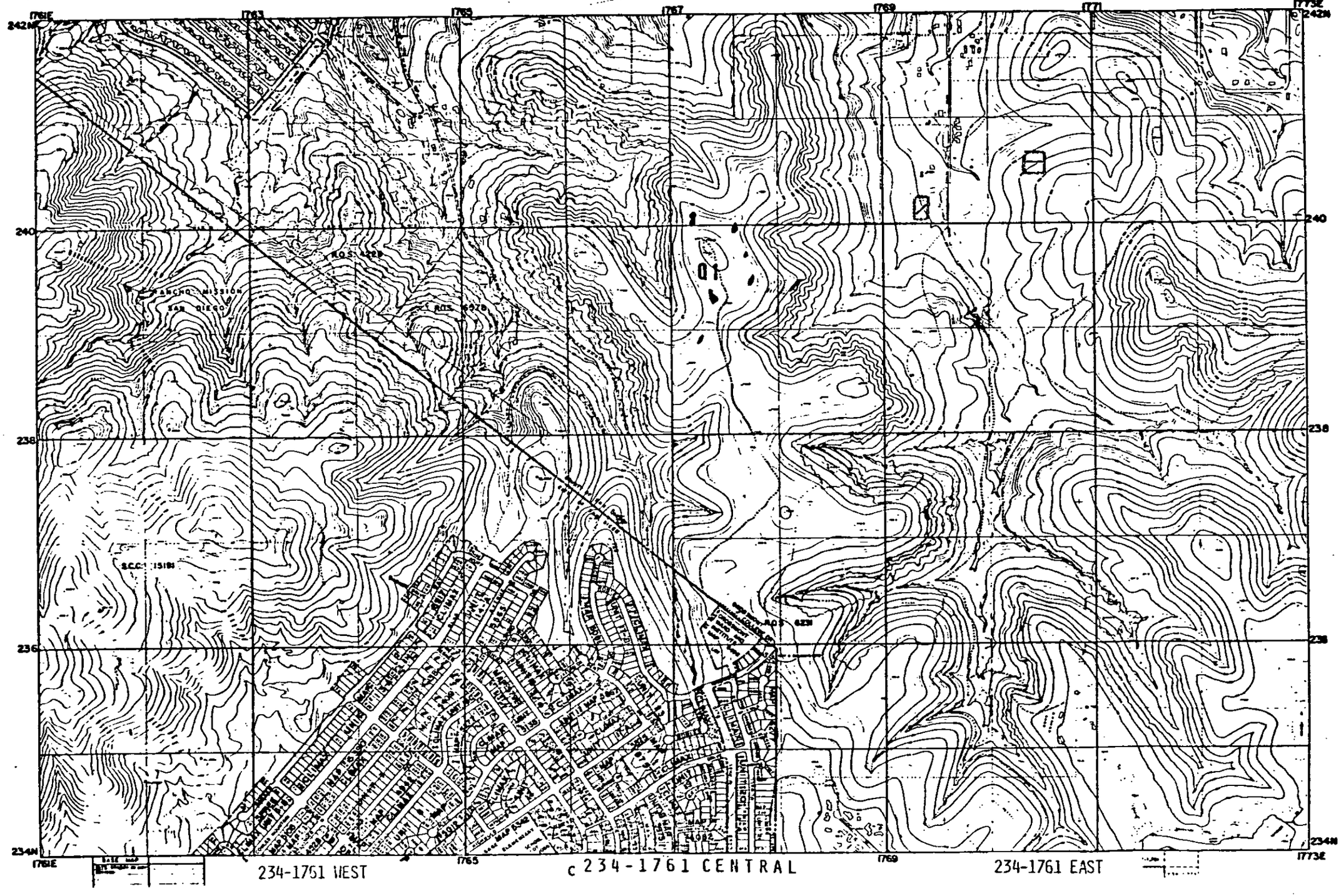
APRIL 218-1713 WEST

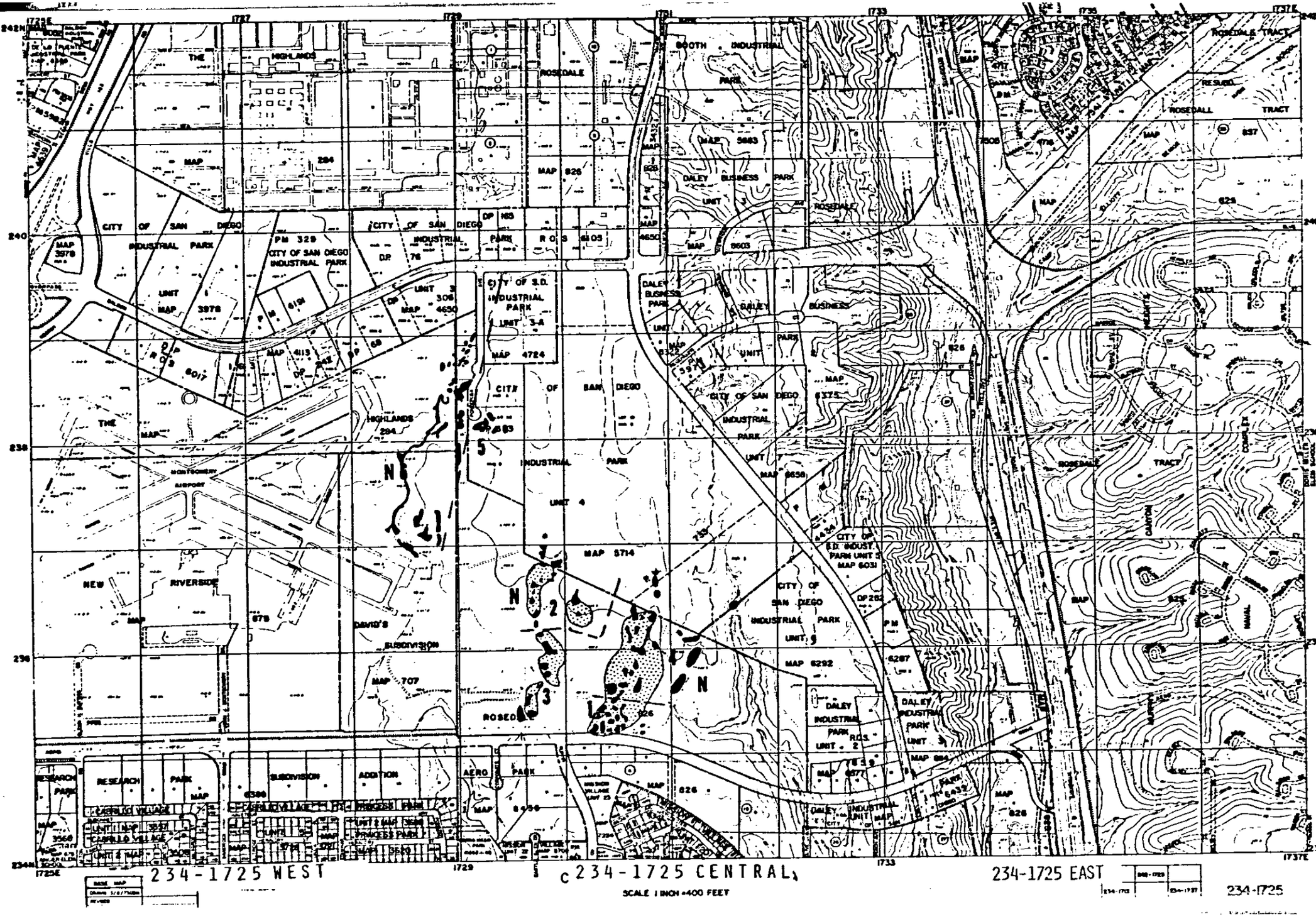
CITY 218-1713 CENTRAL ENIA

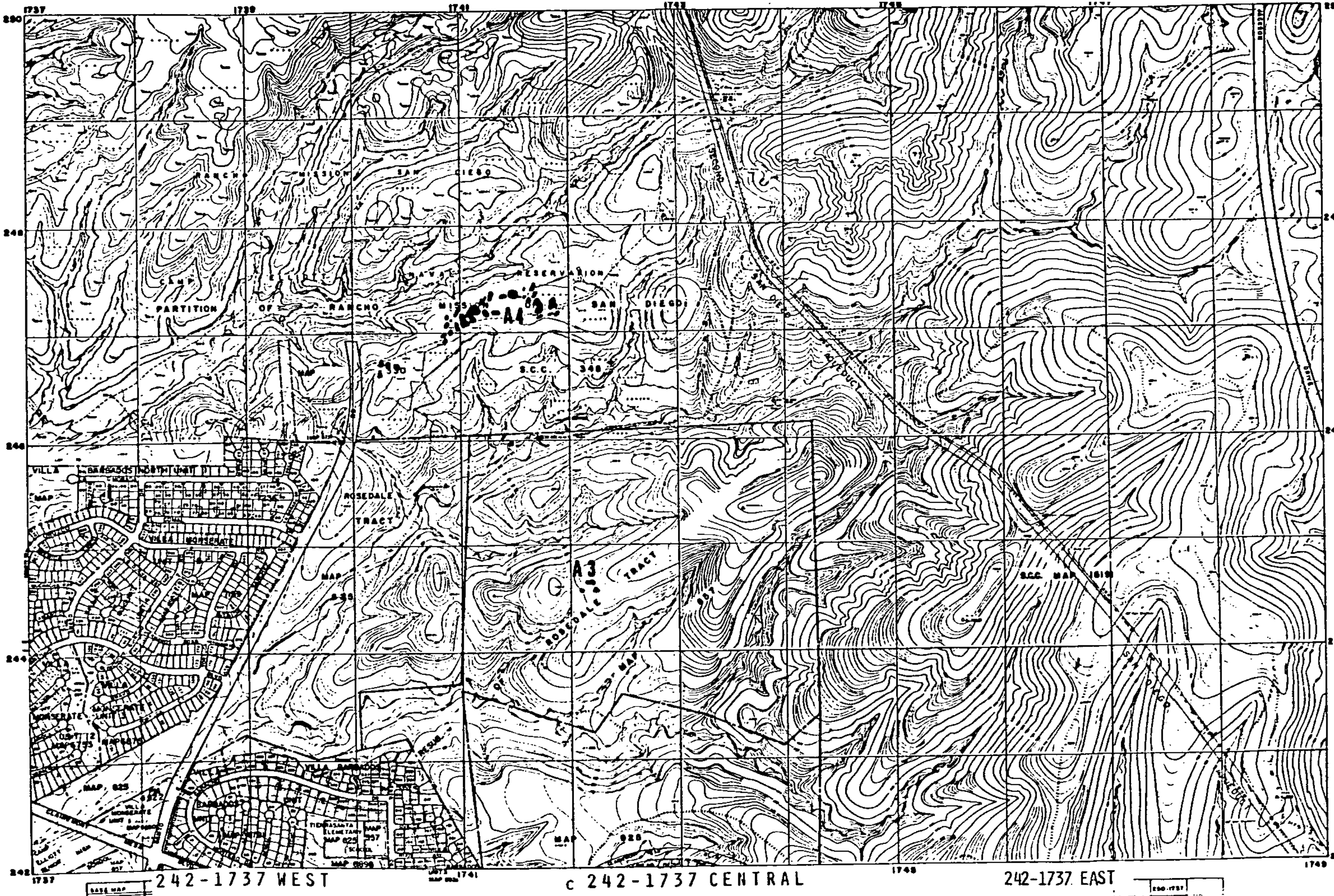
SCALE 1 INCH - 400 FEET

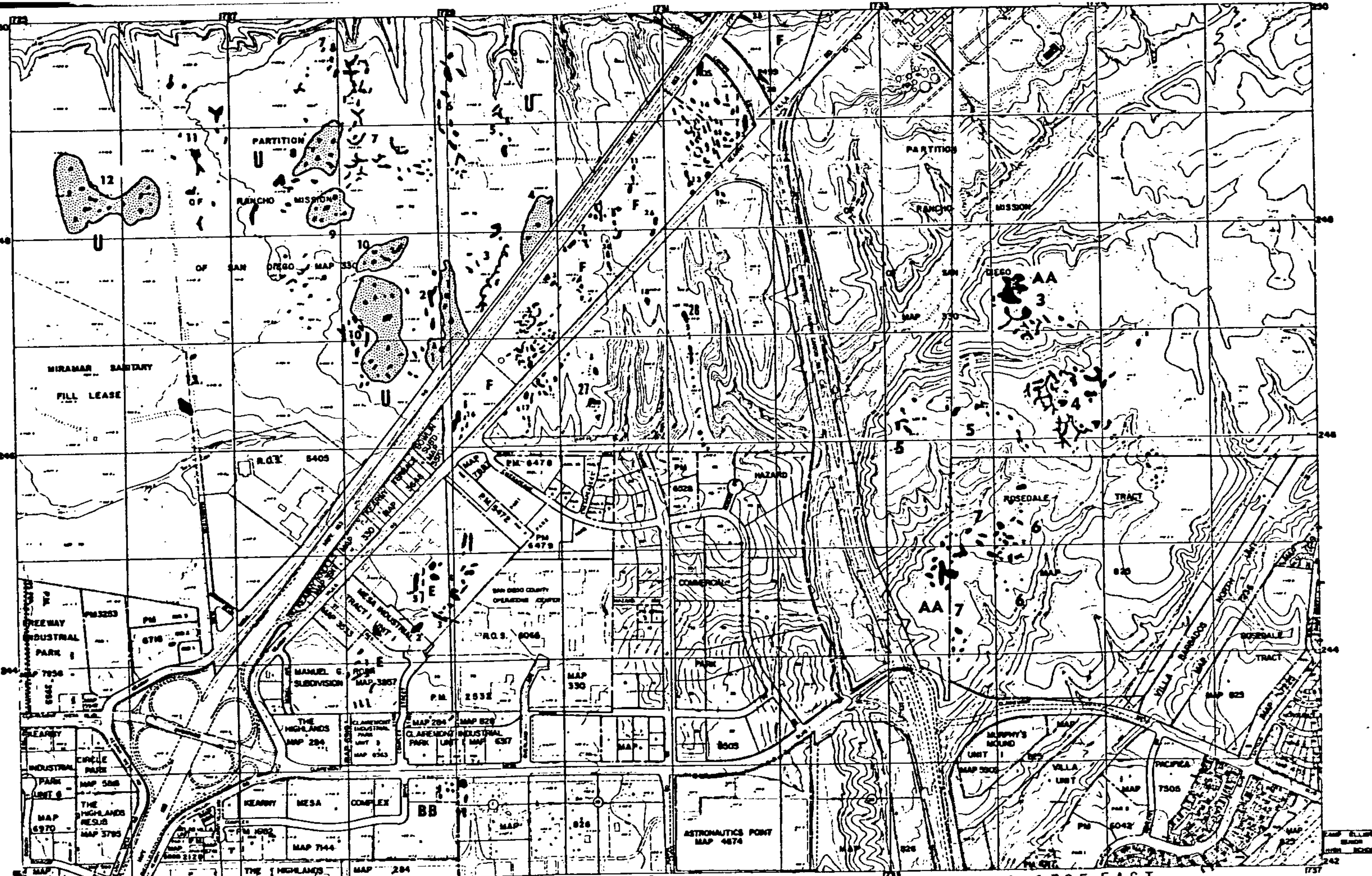
218-1713 EAST


226-1737 WEST
226-1737 CENTRAL
226-1737 EAST
SCALE 1 INCH = 400 FEET
226-1737


234-1761 WEST
c 234-1761 CENTRAL
234-1761 EAST


234-1725 WEST
234-1725 CENTRAL
234-1725 EAST
SCALE 1 INCH =400 FEET
234-1725


1737
1739
1741
1743
1745
1749
250
248
246
244
242
RANCHO MISSION SAN DIEGO
CAMP
PARTITION OF RANCHO MISSION SAN DIEGO
NAVAL RESERVATION
A4
A3
S.C.C. 348
ROSEDALE TRACT
MAP 825
MAP 926
S.C.C. MAP 1619
VILLA BARBADOS NORTH UNIT 1
VILLA MONSERATE
VILLA BARBADOS
TIERRASANTA ELEMENTARY SCHOOL
242-1737 WEST
c 242-1737 CENTRAL
242-1737 EAST

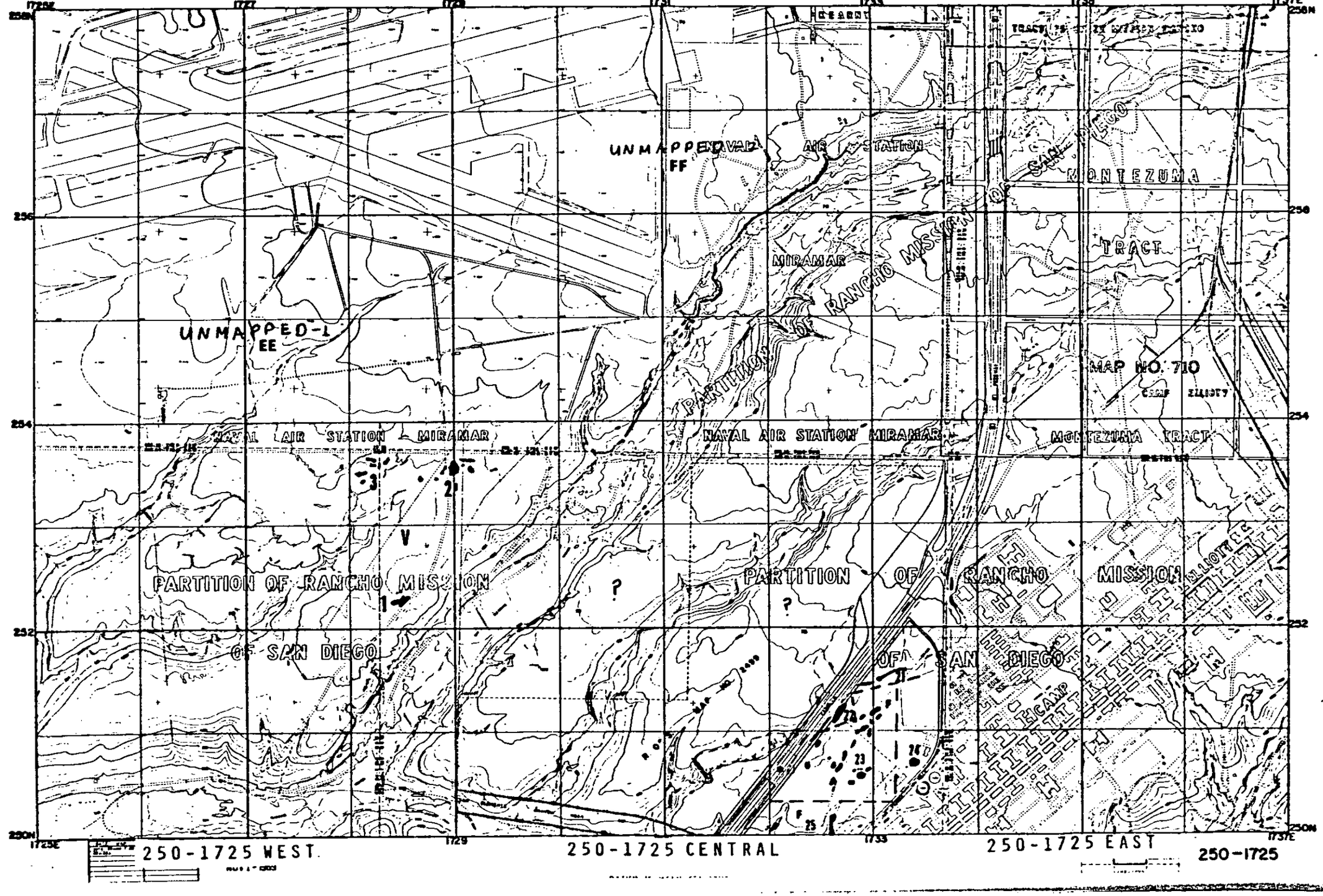

MIRAMAR SANITARY
FILL LEASE
PARTITION
OF RANCHO MISSION
OF SAN DIEGO MAP 330
R.O.S. 5405
FREEWAY INDUSTRIAL PARK
MANUEL G. ROSE SUBDIVISION MAP 3857
THE HIGHLANDS MAP 284
KEARNY MESA COMPLEX
THE HIGHLANDS
MAP 7144
MAP 284
ASTRONAUTICS POINT MAP 4674
SAN DIEGO COUNTY OPERATIONS CENTER
R.O.S. 8046
MAP 330
COMMERCIAL
HAZARD
ROSEDALE TRACT
MAP 825
MURPHY'S MOUND
VILLA UNIT
PACIFICA
MAP 7505
VILLA BARBADOS
MIRAMAR SANITARY
CAMP ELLIOTT JUNIOR HIGH SCHOOL
AA
BB

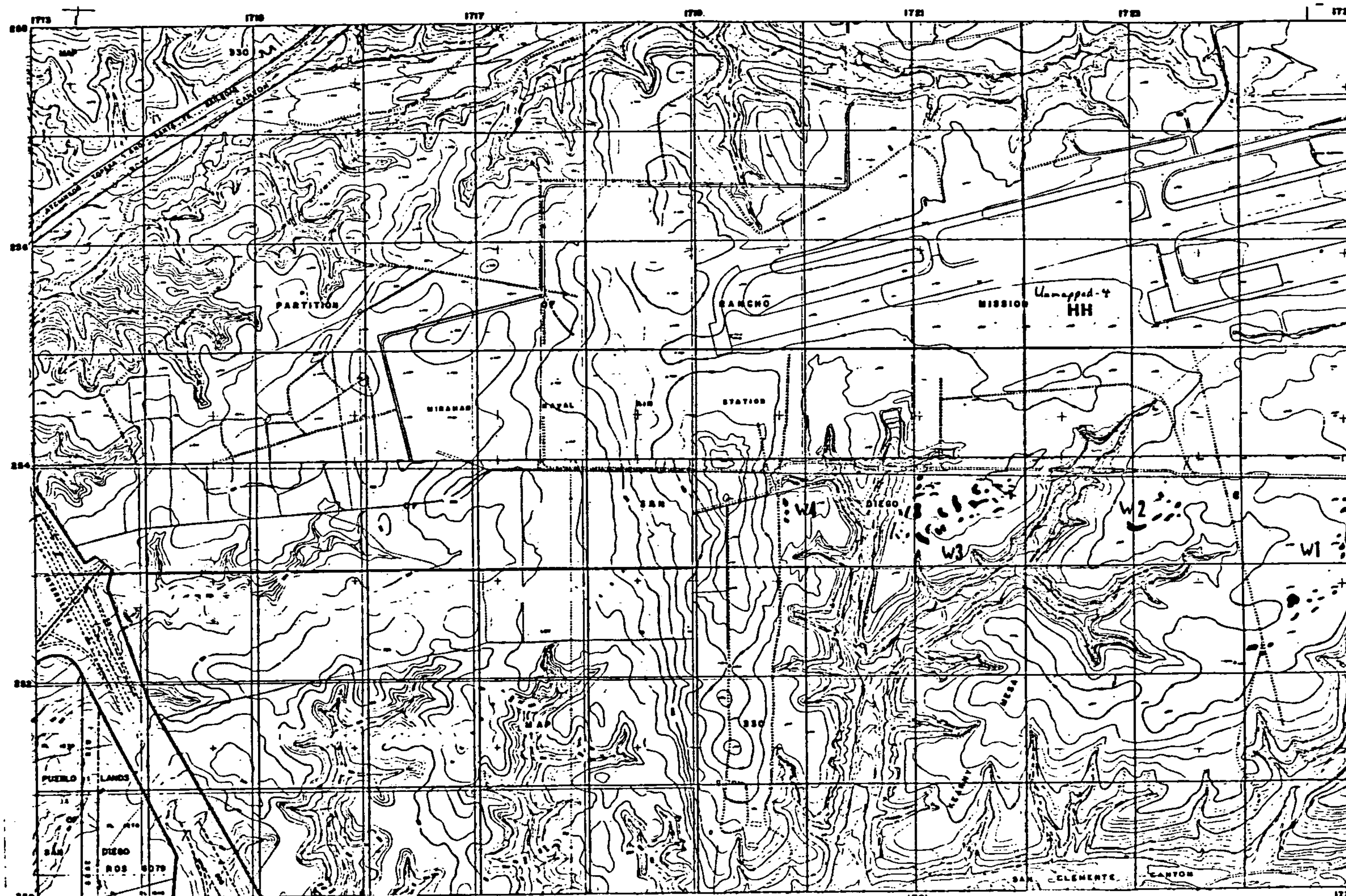
242-1725 WEST

c 242-1725 CENTRAL

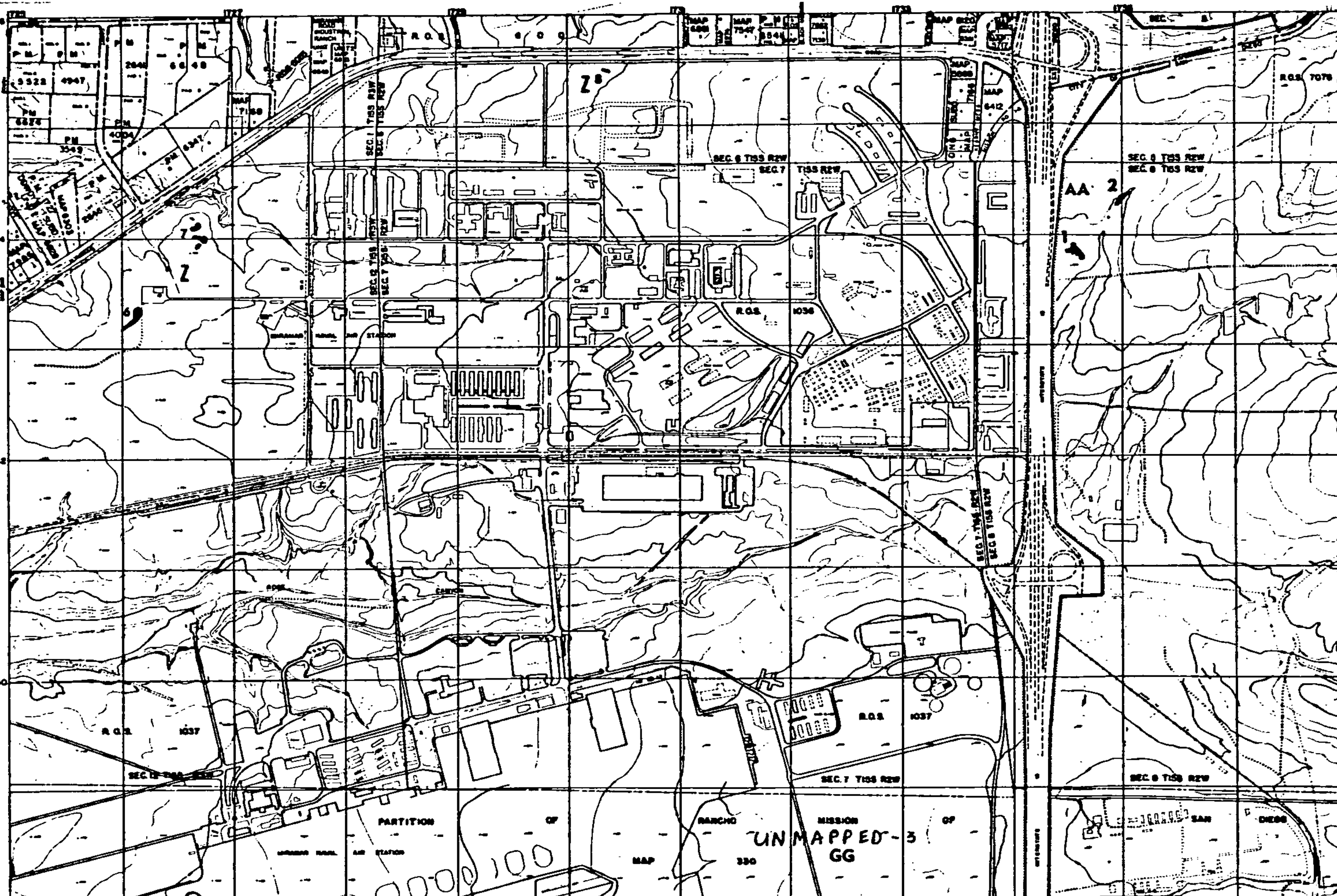
SCALE 1 INCH = 400 FEET

242-1725 EAST


UNMAPPED-1
EE
UNMAPPED-2
FF
NAVAL AIR STATION MIRAMAR
NAVAL AIR STATION MIRAMAR
PARTITION OF RANCHO MISSION
OF SAN DIEGO
PARTITION OF RANCHO MISSION
OF SAN DIEGO
MIRAMAR
PARTITION OF RANCHO MISSION OF SAN DIEGO
MONTEZUMA
TRACT
MAP NO. 710
MONTEZUMA TRACT
CAMP ELLIOTT
250-1725 WEST
250-1725 CENTRAL
250-1725 EAST
250-1725



250-1713 WEST CITY 250-1713 CENTRAL ORNIA 250-1713 EAST

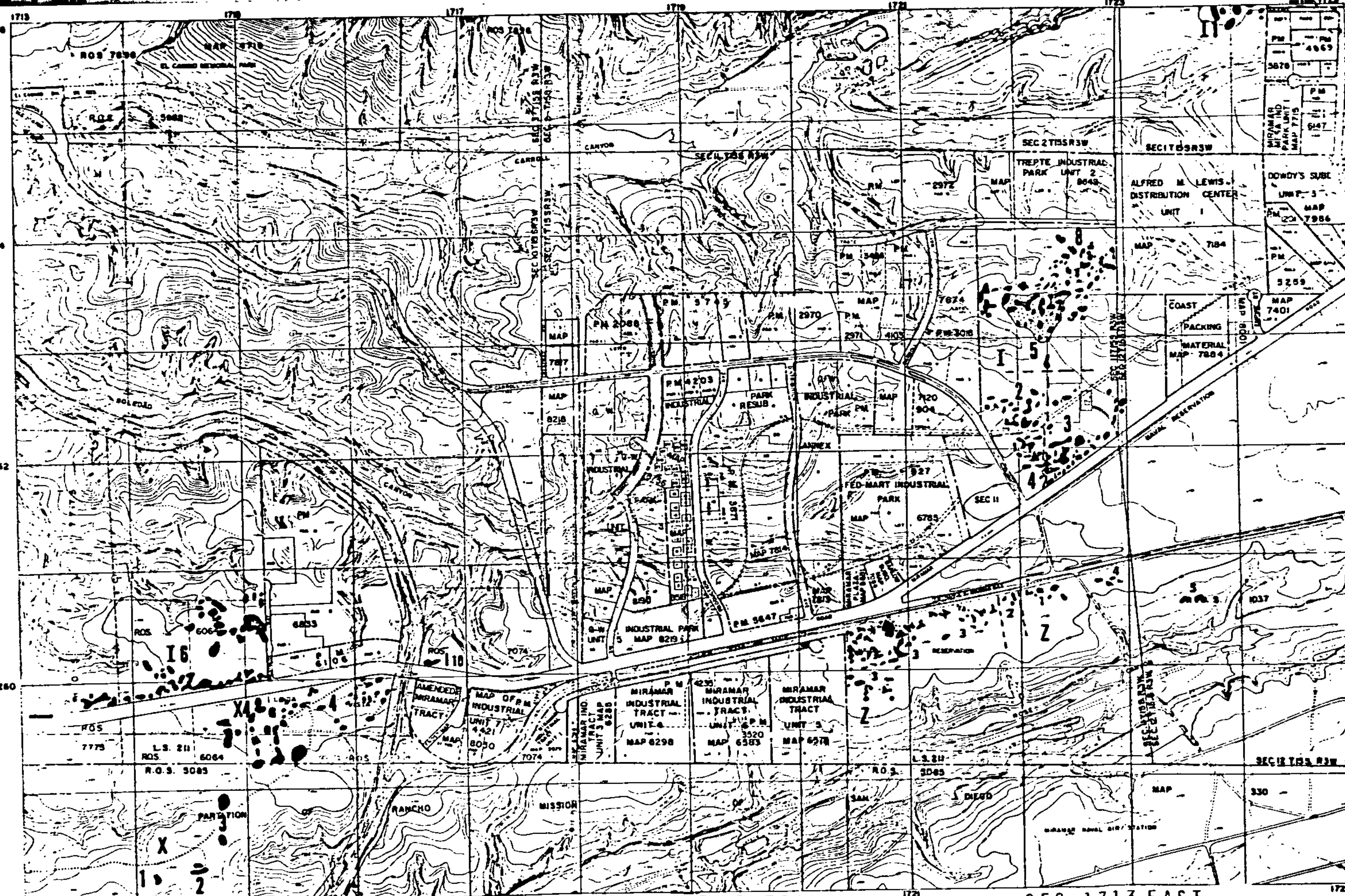


258-1725 WEST

CITY 258-1725 CENTRAL FORNIA

DATUM IS MEAN SEA LEVEL

258-1725 EAST

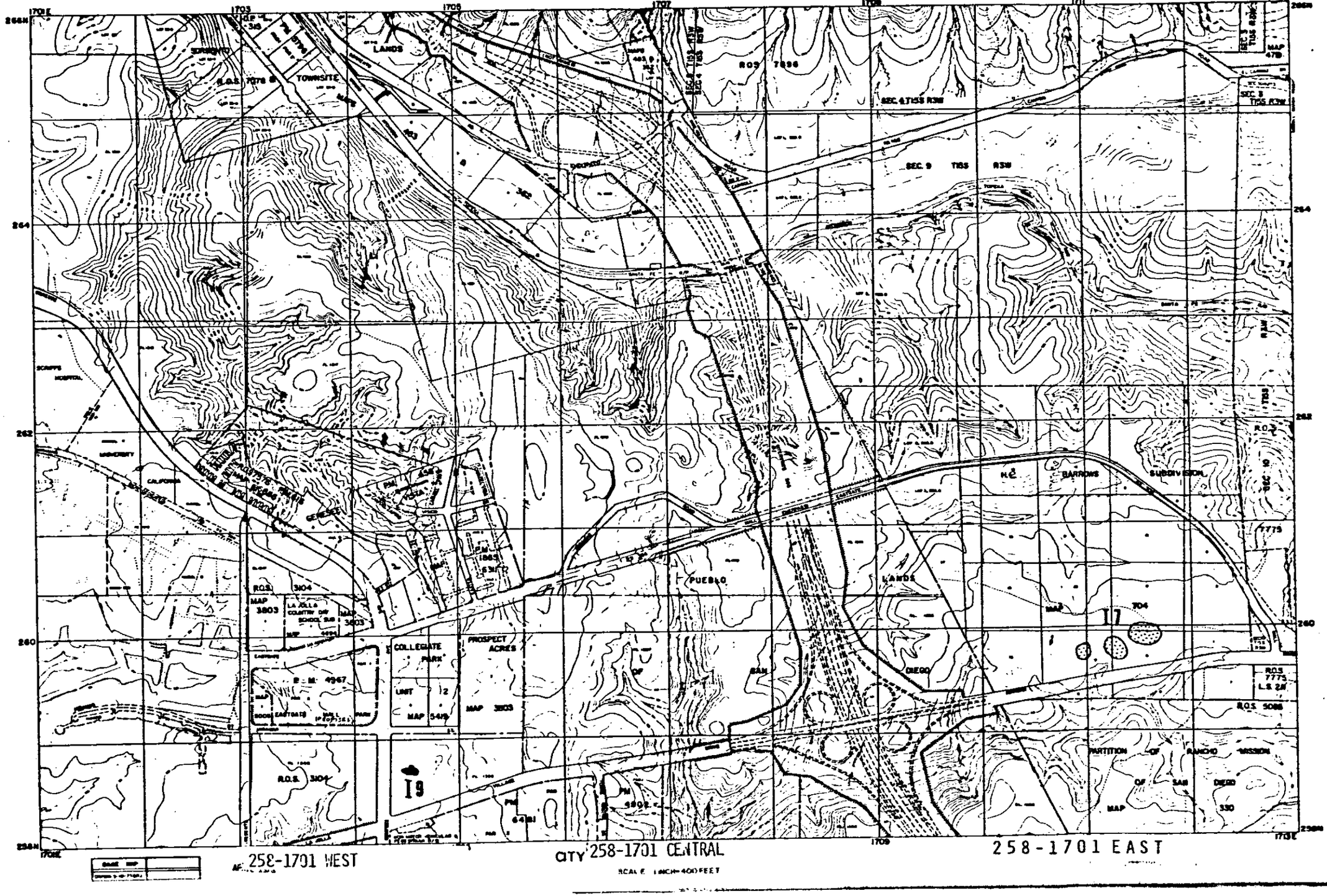


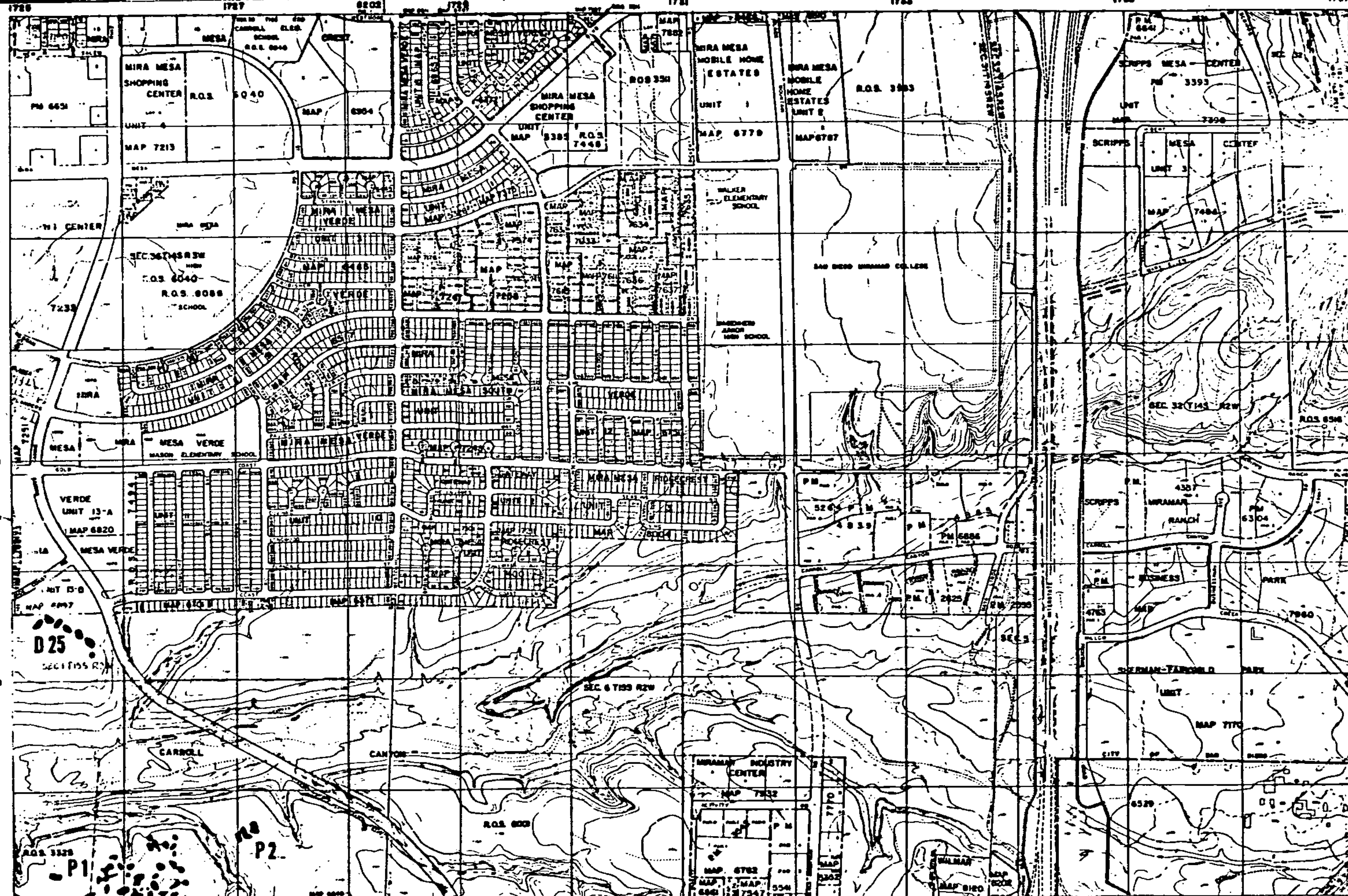
CIT 258-1713 WEST

258-1713 CENTRAL

258-1713 EAST

SCALE 1 INCH = 400 FEET

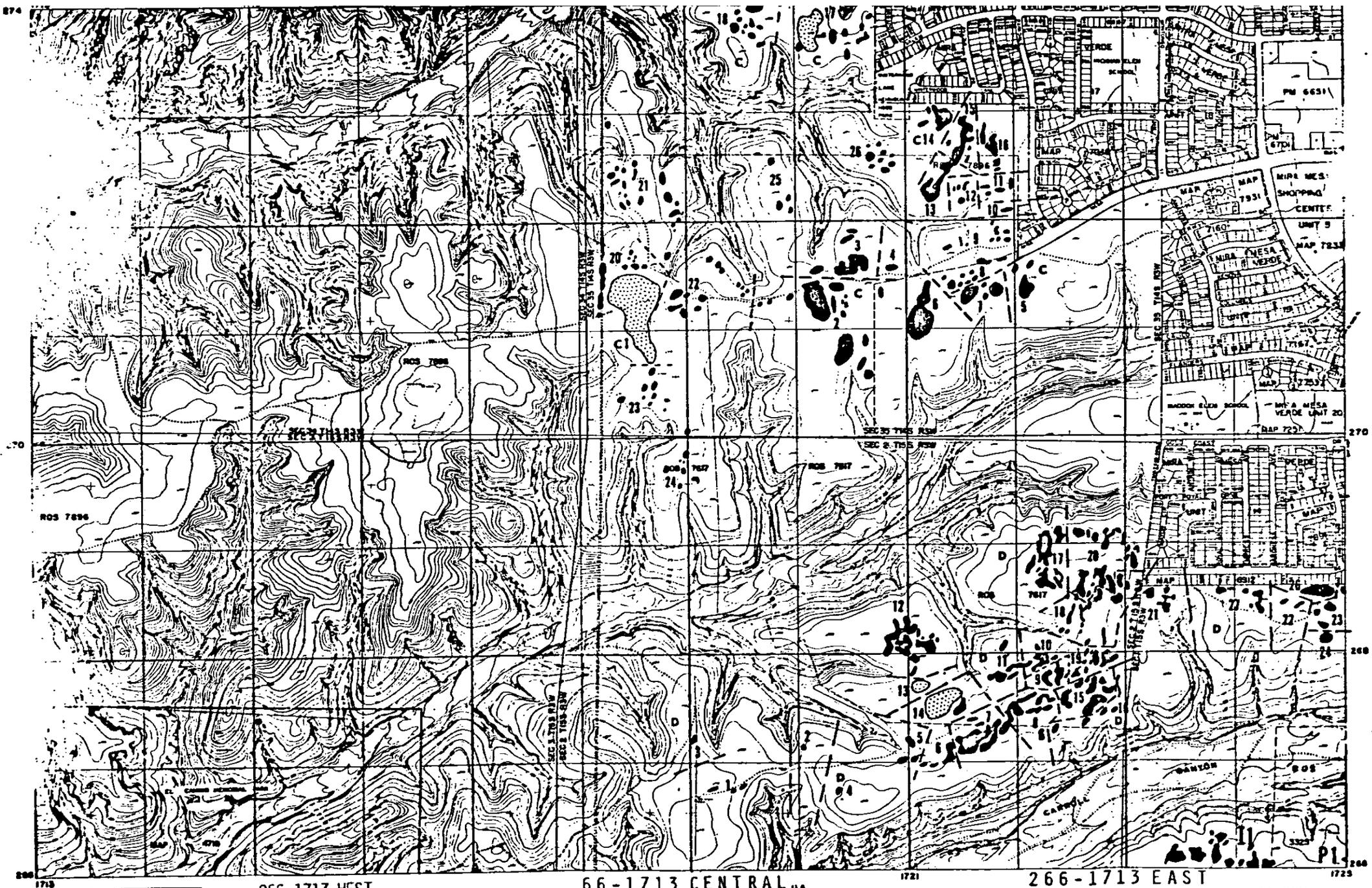

258-1701 WEST
258-1701 CENTRAL
258-1701 EAST
SCALE 1 INCH = 400 FEET
SCRIPPS HOSPITAL
LA JOLLA COUNTRY DAY SCHOOL SUB
COLLEGIATE PARK
UNIT 2
MAP 5419
PROSPECT ACRES
MAP 3803
R.O.S. 3104
R.O.S. 7775
R.O.S. 5088
PUEBLO LANDS
BARROWS SUBDIVISION
PARTITION OF RANCHO MISSION OF SAN DIEGO
MAP 330
I9
I7


MIRA MESA SHOPPING CENTER
R.O.S. 5040
MAP 7213
MIRA MESA SHOPPING CENTER
R.O.S. 7446
MAP 5385
ROS 3511
MIRA MESA MOBILE HOME ESTATES
MAP 6779
MIRA MESA MOBILE HOME ESTATES UNIT 2
MAP 6787
R.O.S. 3983
SCRIPPS MESA CENTER
PM 3393
PM 6651
SEC.36 T14S R3W
R.O.S. 6040
R.O.S. 6086
WALKER ELEMENTARY SCHOOL
SAN DIEGO MIRAMAR COLLEGE
MIRA MESA VERDE
MASON ELEMENTARY SCHOOL
VERDE UNIT 13-A
MAP 6820
MIRA MESA ROSECREST
SEC. 32 T14S R2W
SCRIPPS MIRAMAR RANCH
PM 6304
BUSINESS PARK
D 25
SEC 6 T15S R2W
CARROLL
CANYON
SHERMAN-FAIRCHILD PARK
MAP 7170
R.O.S. 600
MIRAMAR INDUSTRY CENTER
MAP 7932
P1
P2
R.O.S. 3325

266-1725 WEST

CITY 266-1725 CENTRAL

266-1725 EAST



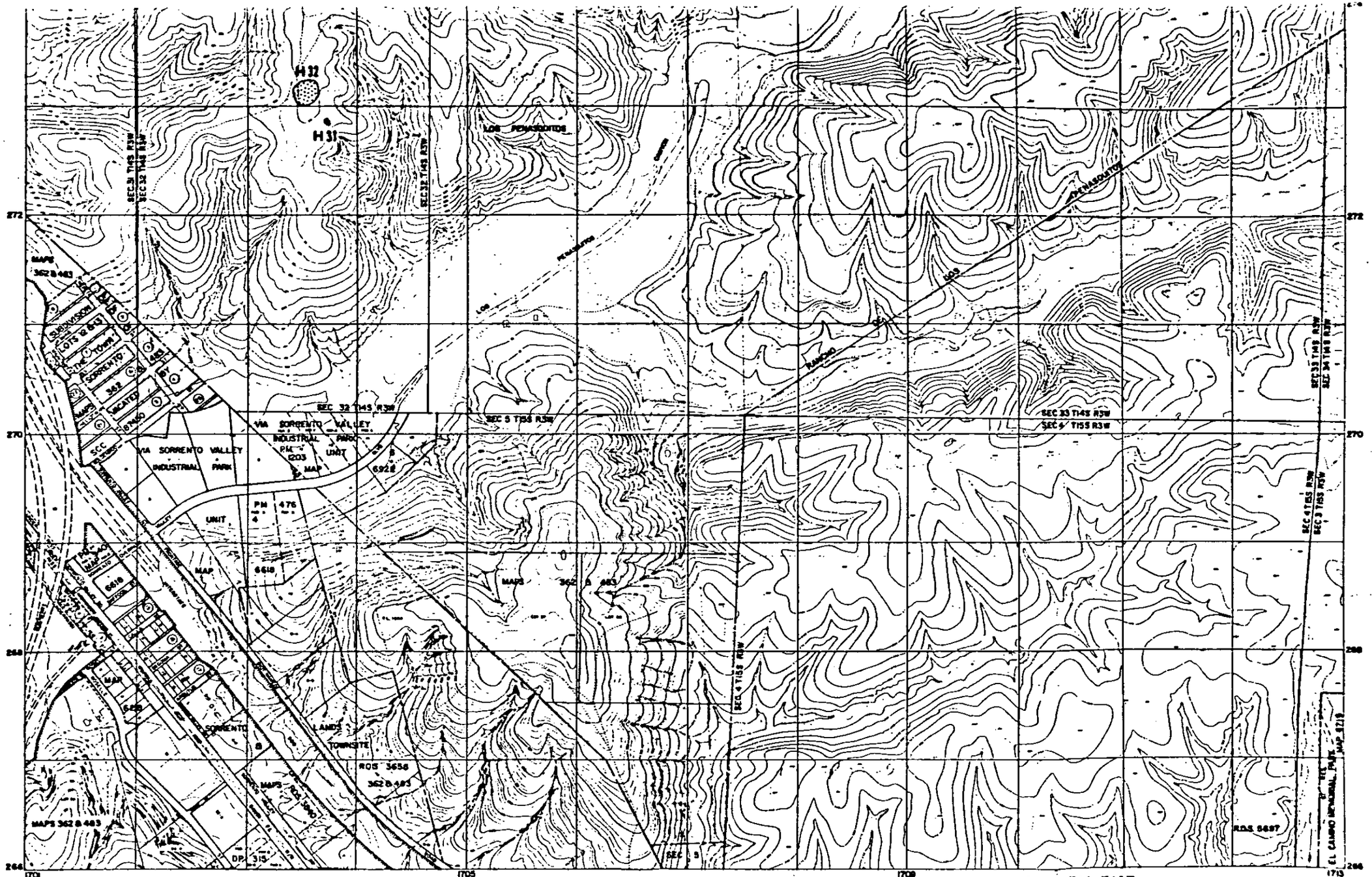
266-1713 WEST

66-1713 CENTRAL IIA

266-1713 EAST

266-1713

SCALE 1 INCH = 400 FEET



266-1701 WEST

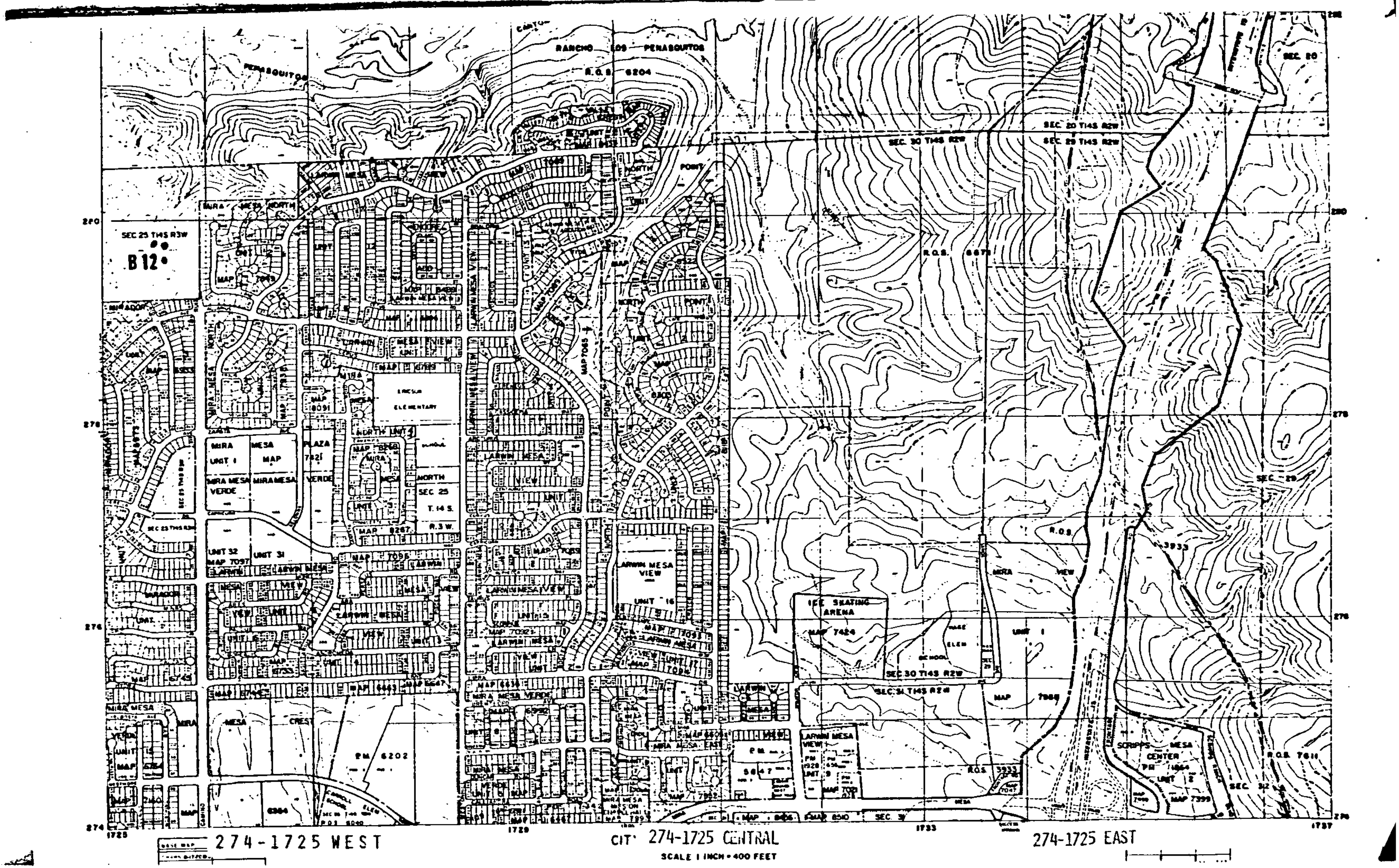
SEPT 1973

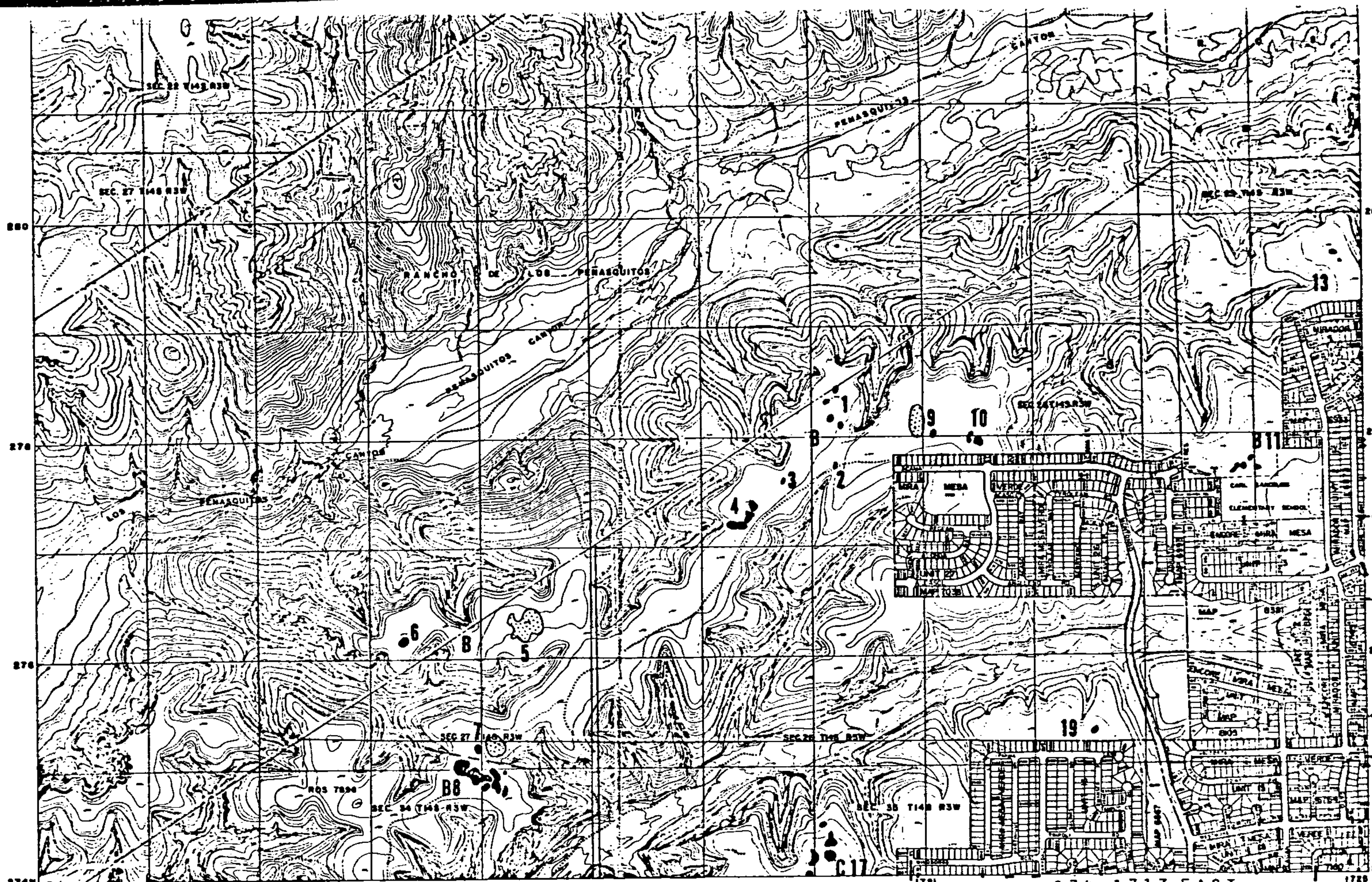
CIT 265-1701 CENTRAL

DATUM IS MEAN SEA LEVEL

266-1701 EAST

266-1701

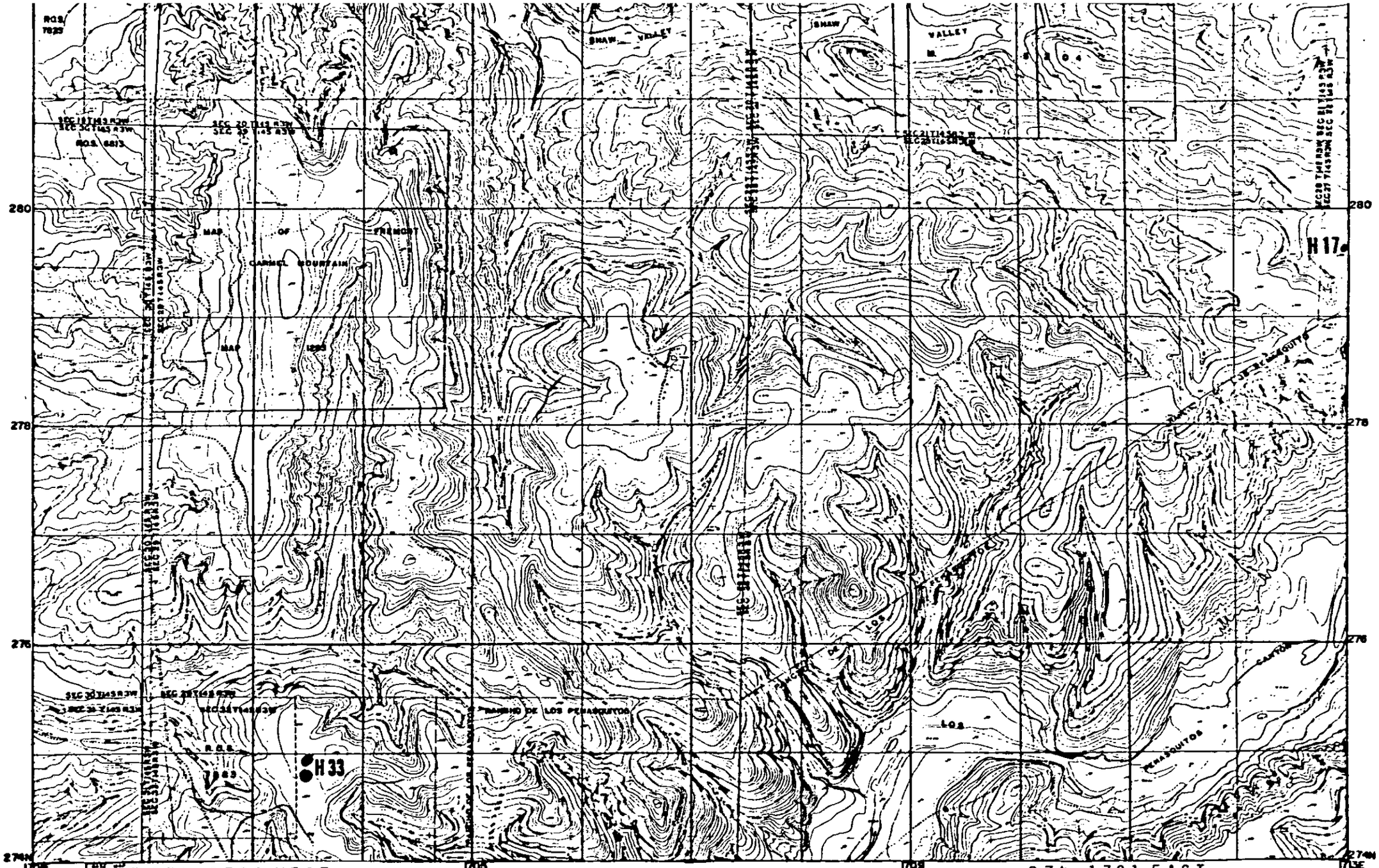

RANCHO LOS PENASQUITOS
R.O.S. 6204
SEC 25 T14S R3W
B 12
MIRA MESA NORTH
LARWIN MESA VIEW
SEC. 30 T14S R2W
SEC. 29 T14S R2W
SEC. 20 T14S R2W
SEC. 20
R.O.S. 6671
ELEMENTARY
MIRA MESA
UNIT 1
MAP
PLAZA
MIRA MESA VERDE
SEC 25
T.14 S.
R.3 W.
UNIT 32
MAP 7097
UNIT 31
LARWIN MESA VIEW
UNIT 16
ICE SKATING ARENA
MAP 7424
SEC 30 T14S R2W
SEC 31 T14S R2W
MIRA VIEW
UNIT 1
MAP 7066
R.O.S. 3933
SEC. 29
SCRIPPS MESA CENTER
MAP 7399
R.O.S. 7611
SEC. 32
MESA
CREST
PM 6202
MIRA MESA EAST
SEC. 31
MAP 6806
MAP 6510
274-1725 WEST
CIT 274-1725 CENTRAL
SCALE 1 INCH = 400 FEET
274-1725 EAST

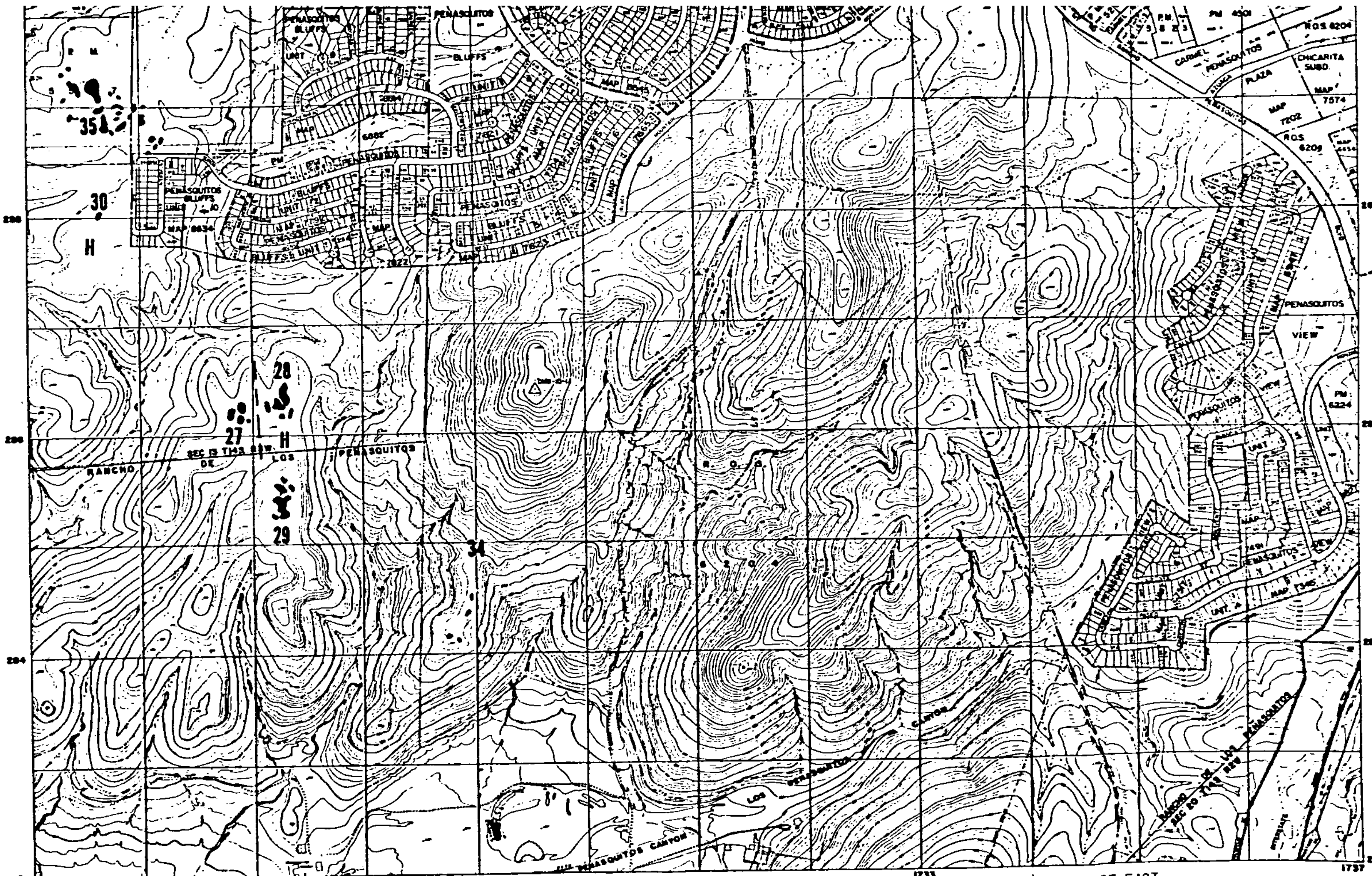


274-1713 WEST

c 274-1713 CENTRAL

274-1713 EAST


SHAW VALLEY
MAP OF CARMEL MOUNTAIN
FREMONT
H 33
H 17
LOS PEÑASQUITOS
280
278
276
274N
1708
1709
1710E
274-1701 WEST
274-1701 CENTRAL
274-1701 EAST
274-1701
SCALE 1 INCH = 400 FEET
DATUM IS MEAN SEA LEVEL



282-1725 WEST

CIT 282-1725 CENTRAL

SCALE 1 INCH = 400 FEET
DATUM IS MEAN SEA LEVEL

282-1725 EAST

282-1725


282-1713 WEST
282-1713 CENTRAL
282-1713 EAST
282-1713


298N
296
294
292
290N
1749E
1761E
CC
CC7
290-1749 WEST
290-1749 CENTRAL
290-1749 EAST
90-1749

298-1749 WEST | CIT | 238-1749 CENTRAL | 238-1749 EAST

SCALE 1 INCH = 400 FEET

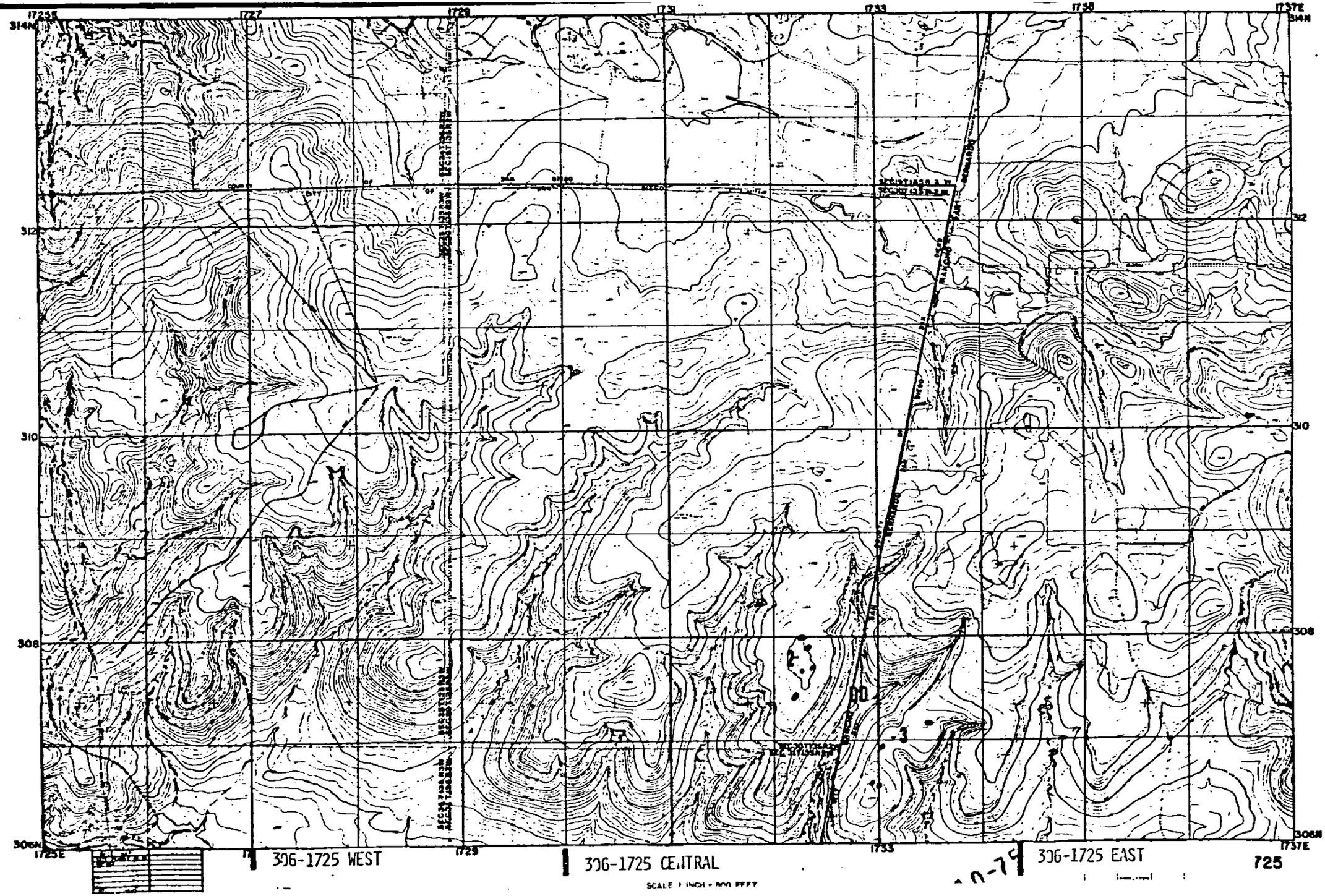
298-1749

306-1737 WEST
APRIL 1978

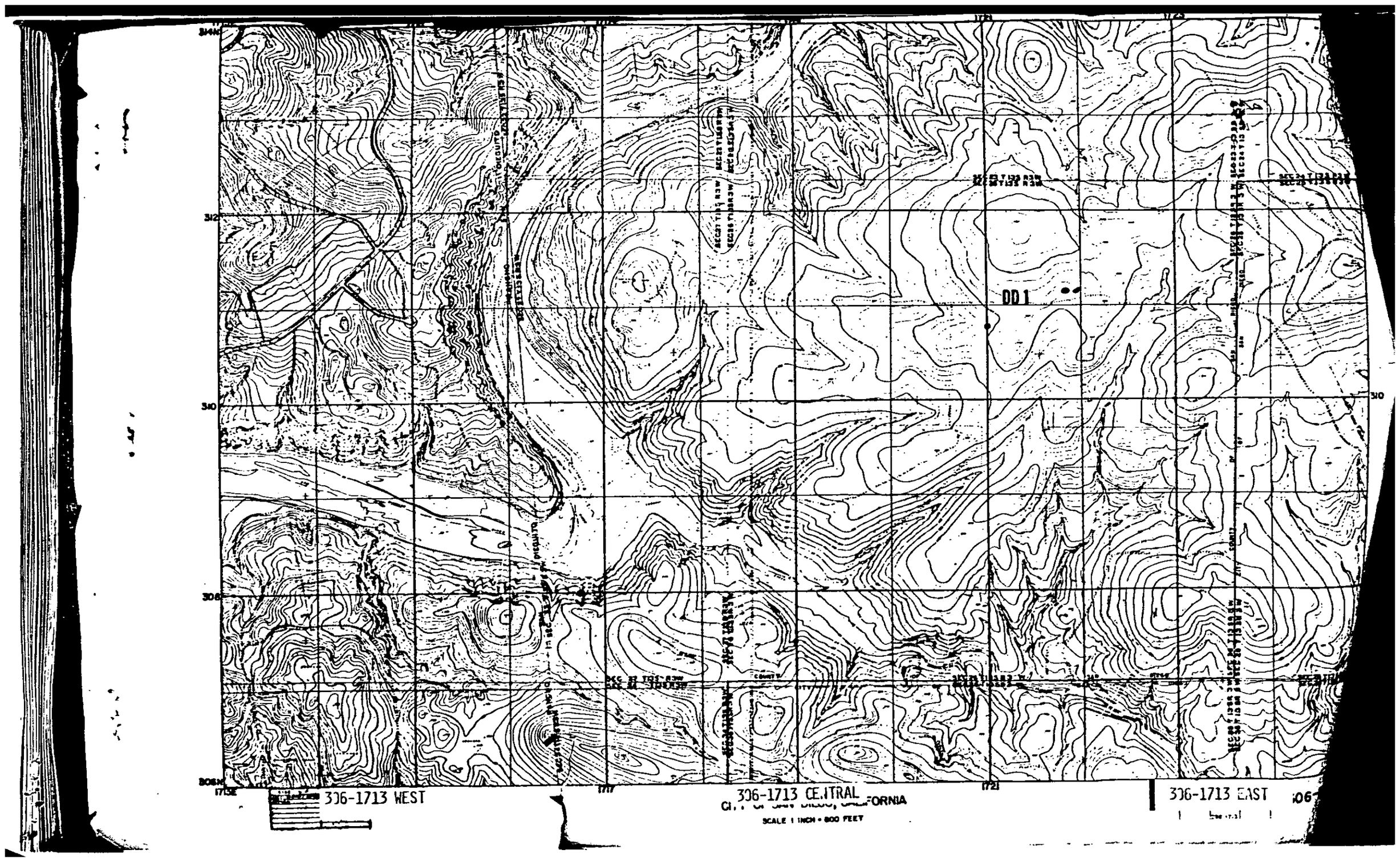
306-1737 CENTRAL
SCALE 1 INCH=400 FEET
DATUM IS MEAN SEA LEVEL

306-1737 EAST

306-1737


1725E
1727
1729
1731
1733
1735
1737E
314N
312
310
308
306N
306-1725 WEST
306-1725 CENTRAL
306-1725 EAST
SCALE 1 INCH = 800 FEET

725


DD 1
306-1713 WEST
306-1713 CENTRAL
306-1713 EAST